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PROCEEDINGS OF THE WESTERN PSYCHOLOGICAL ASSOCIATION, LOS ANGELES, CALIFORNIA, JUNE 28–29, 1935

ROBERT C. TRYON, SECRETARY, UNIVERSITY OF CALIFORNIA

The Association met with the Pacific Division of the A.A.A.S. at the University of California at Los Angeles. Six sessions were held on the two days, June 28 and 29. A feature of general interest was a symposium, described below, which attracted a large audience. On June 29 a joint session was held with the Society for Research in Child Development. Approximately 200 attended the sessions, 100 the annual banquet. The chairman of local arrangements was H. C. Gilhousen.

Officers elected for the ensuing year, 1935–1936, were:

President: G. M. Fernald, University of California at Los Angeles.

Vice-President: R. H. Gundlach, University of Washington, Seattle.

Secretary-Treasurer: R. C. Tryon, University of California, Berkeley.

The Association will again meet with the A.A.A.S. in June, 1936, at the University of Washington, Seattle.

PROGRAM

The symposium question was: "Is the Quantitative Scientific Method Adequate for the Analysis and Prediction of Mental States or of Behavior?" The participants and titles of their papers were:

Introduction. ROBERT C. TRYON, University of California.

The Point of View of Conditioned Response Psychology. EDWIN R. GUTHRIE, University of Washington.

The Point of View of Experimental Psychology. WARNER BROWN, University of California.

The Point of View of Social Psychology. KNIGHT DUNLAP, University of California at Los Angeles.

The Point of View of Mental Measurement. H. E. GARRETT, Columbia University.

The Point of View of Educational Psychology. A. S. RAUBENHEIMER, University of Southern California.

The Point of View of Comparative Psychology. EDWARD C. TOLMAN, University of California.

The Point of View of Gestalt Psychology. R. H. WHEELER, University of Kansas.

The Point of View of Clinical Psychology. JEAN W. MACFARLANE, University of California.

Abstracts of papers presented at the other sessions follow.

The Appearance of Tours and Rolls in the Song of the Roller Canary. ESTHER ABBOTT, University of Southern California. (Introduced by Milton Metfessel.)

This problem is one aspect of the study of the development of song in canaries, reared in isolation and in sound proof cages. Recordings were made of 8 birds from the time of hatching until the song was fully developed. Careful study was made of the recordings to determine the age of the bird at the time of the appearance of each tour and roll.

Equivalent and Non-equivalent Stimuli in Size Discrimination in the White Rat. E. L. BALLACHEY, University of California.

Some Aspects of Physical Growth in Young Children. NANCY BAYLEY, University of California.

Approximately 50 children have been measured and observed repeatedly at regular intervals from birth through 6 years of age. Measures which are concerned with physical maturation include: (1) anthropometric measures; (2) records of bone development, in (a) X-rays, and (b) records of dentition; and (3) measures of physiological maturation-temperature, pulse and breathing rate, and blood pressure. Age changes in all of these measures are characteristic of the group, but there are individual differences both in the absolute size of the measures and their rates of change. There is little interrelation between the three different types of development studied

here, beyond their common characteristic of rapid growth. Illnesses and physicians' ratings of health appear to be unrelated, for the most part, to growth over the six-year period. None of the aspects of physical growth presented here have any significant relation to individual differences in development of mental and motor abilities.

Attempted Modification of the Eyelid Reflex to Light by the Conditioning Technique. W. C. BIEL, Stanford University. (Introduced by E. R. Hilgard.)

An attempt was made to sensitize the eyelid reflex to light by following the light invariably with an air-puff to the cornea after a 100 millisecond interval, the situation being theoretically favorable for such a change to take place. Such modification of reflexes has been designated 'alpha' conditioning by Hull to distinguish it from the more usual longer latency responses (beta). Responses photographically recorded from 20 subjects failed to show alpha conditioning under these circumstances.

Spinal Cord Mechanisms Involved in Solving Problems in Sensory Discrimination: II. The Ability of Rats with Spinal Cord Lesions to Discriminate Linear Distances. CLARENCE W. BROWN, University of California.

The apparatus for measuring the rat's ability to judge linear distance consists of an elevated pathway 6 feet long, along one side of which 3 short paths, 8 inches long, are placed. The short paths lead away from the long path at right angles, the middle one being the true path leading to the next unit or to food, the other 2 being blinds. The true path remains at a fixed distance from the point of entrance to the unit. The blinds can be placed at varying distances from the true path. By systematically varying these distances a measure of the rat's threshold for judging linear distances can be obtained. By using 5 of these units arranged linearly it has been possible to obtain a reliability of .95. To prevent the rat from using cues other than kinesthesis a number of precautions must be taken. Visual cues are eliminated by using blinded rats. Olfactory cues are controlled by interchanging the short paths used for the true path and the blinds and by using a runway considerably longer than 6 feet for the discrimination path and shifting it in reference to the blinds and true path. Tactual cues are taken account of by inserting extra blinds during crucial test runs. A group of normal rats and a group of rats with spinal cord lesions have been trained on the apparatus. No significant difference was found between the operated and control

animals either in rate of learning to discriminate or in the difference threshold for the discrimination of linear distances.

Detection of Incompetent Drivers—Preliminary Report. S. HELEN BROWN, Chaffey Junior College.

Accident records consistently show that a small per cent of drivers is responsible for a large per cent of accidents. Psychological performance tests to distinguish the potentially least and most able applicants for drivers' licenses are in process. A survey of licensing methods from various states and foreign countries shows a diversity in procedure from no attention to licensing to very close and periodic supervision.

On the Law of Effect. WARNER BROWN, University of California.

Punishment may operate either (a) to decrease the tendency to repeat the punished errors or (b) to accelerate learning by inducing the learner to try harder. In this experiment the subjects were required to learn which one of 3 buttons was "correct" at each of 24 successive choice-points. Electric shock was attached to one of the 2 "incorrect" buttons at each choice-point. It was found that the errors which carry shock are not eliminated faster than the other errors. In a second experiment shock was connected to half the "correct" buttons and also, as before, to half the "incorrect" ones. The greater total amount of shock under the second arrangement reduces the number of trials required for learning, but the "correct" buttons carrying shock are not more easily learned than those not so emphasized.

Multiple Gradients in Mazes. JACK BUEL, University of California. (Introduced by E. C. Tolman.)

The possibility of several gradients functioning simultaneously in maze learning has recently been suggested. Correlations between the actual angular degree to which each blind of a fourteen-unit T-maze pointed toward the maze entrance or exit and obtained errors were calculated. Four groups were used, hungry-rewarded, hungry-non-rewarded, less-hungry-rewarded, and less-hungry-non-rewarded. Correlations between degree of *exit* pointingness and *first* trial errors were .76, .73, .55, and .53 respectively, and for trials 2–11 were .83, .78, .82, and .85 respectively. Correlations between degree of *entrance* pointingness and *first* trial errors were .29, .29, .21, and .27 respectively, and for trials 2–11 were .32, .30, .44, and .46 respectively.

Weighting the angles according to goal gradient principles and the use of weighted and unweighted resultants of the entrance-exit vectors did not significantly increase the correlations. It was tentatively suggested that in the absence of a developing tendency in the gradient due to maze experience the error order of the maze is mainly the result of specific mechanical factors inherent in the maze design and structure.

The Relation of Age to Skill of Expert Chess Players. PAUL BUTTENWIESER, Stanford University.

The lifetime records of 100 chess masters, playing under standard tournament conditions, constituted the data for a study of the relation of age to performance of highly endowed, maximally practiced, optimally motivated subjects in a complex mental skill. The possibility of selective bias was eliminated by virtue of repeated measurements on all players throughout their competitive spans (of from 2 to 5 decades' duration). Reliability of the measurements obtained was evident from the interdecade *r's* (ranging from .67 to .77). The composite age-curve, based on the median trend, indicates some improvement in skill from the twenties to the thirties, when a plateau is reached extending through the forties. From 50 to 70 occurs a steady drop which, while a statistically reliable decrement, is extremely slight relative to the range of skill among chess players generally. Study of the individual records reveals marked departures from the median age-trend.

Rate of Maturation of Vocal Patterns in the Roller Canary. CONSTANCE CHANDLER, University of Southern California. (Introduced by Milton Metfessel.)

As one aspect of a comprehensive study of maturation of vocal patterns in the roller canary, conducted by Dr. Metfessel in the University of Southern California laboratory, this paper attempts to outline the principal characteristics of vocal development as to rate or periodicity of notes from the first chirps to complex song patterns, under conditions so controlled as to make learning from external sources impossible. From phonograph records of samplings of the bird's vocalization, kymograph recordings were made. The listening apparatus consisted of phonograph turntable turning at 16 r.p.m., a magnetic tone arm substituted electrically for the tone arm of a victrola, and a victrola amplifier and loud speaker. Recording apparatus consisted of a long paper kymograph, a time line marking

seconds, and a signal magnet controlled manually by a telegraph key. Raw data from the kymograph recordings show the number and duration of audibly distinct vocal impulses per second. That there is a gradual increase in rate is all that can be stated at this stage in the experiment.

Motor Aspects of Emotional Instability. H. KENNETH CHANEY, University of Southern California. (Introduced by Robert H. Seashore.)

An attempt is made to further delimit the meaning of the term 'emotional instability' by determining whether or not there is any relation between the emotional condition and motor coördinations. The experimental group consists of adolescents who have been clinically diagnosed as psychoneurotic and subject to temper tantrums. The experiment includes 2 simple eye-hand coördination tests, an improved Koerth pursuit rotor and the Seashore-Tinker modification of the Brown spool packer. The tests are given in a lengthy series of short trials. The length of the series is calculated to fairly determine certain specific motor functions of the emotionally unstable personality, including the effect of inhibition, shifts of attention, and fatigue. An indication is sought as to whether the same specificity and variability obtain for the motor coördinations of the emotionally unstable as for normal individuals. Finally, can we find motor factors which will be available and valuable for the prediction of emotional stability?

The Effect of Varying Interfixation Distances on Ocular Fixation Movements. BRANT CLARK, University of Southern California.

A total of 1,124 ocular movements were studied using eye movement photography. Eleven college students acted as subjects, and their eyes were photographed while they alternately fixed, first words and then isolated points 26.4°, 20.6°, 14.3°, and 8.6° apart. The records were examined to determine any differences in the method of fixation between varying distances and the different types of fixation objects. No differences were discovered in the methods of fixing words and isolated points. It was found that there were marked differences when the eyes alternately fixed objects which were different distances apart. As the size of the interfixation movements increased more corrective movements were made, and the corrective movements were larger. The size of the convergence movements also increased in a similar way. These findings tend to support the belief that short lines are superior to long lines for reading material.

The Persistence of Behavior Traits in Young Children. H. S. CONRAD and G. N. LUDWIG, University of California.

Galvanometric Reactions of Adolescents to Olfactory Stimuli. CLYDE H. COOMBS and NATHAN W. SHOCK, University of California.

The relationship between galvanometric response and the affective strength and quality of olfactory stimuli has been investigated in a group of 100 adolescent children. Fourteen odors were given as stimuli while simultaneous records of resistance changes in hand and foot were recorded photographically. The rank order reliability of the placement of each odor on a rating scale was approximately .95. Split-half reliabilities of the average of hand and foot deflections were approximately .90. Taking into account the order of presentation the stimuli were divided into 3 groups, on the basis of the mean ratings: pleasant, least unpleasant, and most unpleasant. The pleasant and least unpleasant groups were of equal affective strength but of opposite affective quality. As tentative conclusions, it is suggested that (1) the affective quality of the stimulus must be considered, as well as affective strength, as a factor determining the magnitude of the galvanometric deflection; and (2) for equal degrees of affective strength unpleasant stimuli tend to give greater deflections than pleasant stimuli.

Principles of Cognition of Symbols Applied to the Legible Recording of English. J. E. COOVER, Stanford University.

Individual practice of 11,000 substitutions with each of the Dearborn and Shorthand symbols shows the Shorthand to have lower cognitive value by its lower initial rate, gain in practice, and final rate. Reading rate of Shorthand is 70% that of Dearborn. Immediate memory of naïve subjects shows the same. Cognitive points are more lacking in straight lines and arcs than in more complex symbols. In the wider field of recording English, Pitmanic phonography with its angular and irregular word-outlines has alone won professional distinction, while cursive shorthand is almost universally taught in the public schools and popular business colleges. Legibility lies with Pitman. Because students and others need a legible form of note-taking, and stenography or ABC systems are found impracticable, I have utilized cognitive principles in inventing a 'Note-Script' that saves 70% over longhand and is legible when cold. Exposition demonstrates the construction.

Silent Reading in College Groups Coached by Rhythmic Auditory Pacing Technique. W. M. DANNER, JR., Stanford University.

During the past year 207 Stanford students, four-fifths of them freshmen, one-fifth upper and graduate division, were enrolled for 25 class hours of training in techniques of silent reading. After initial tests they practiced rapid reading of social science materials from their own courses, measuring rate and estimating difficulty and comprehension at each coaching session. Introduction of rhythmic auditory pacing beat was followed by immediate group gains averaging 50 to 100 words per minute. Initial class average reading speeds below 250 words per minute advanced to nearly 400 w.p.m. during the term. Typical gains in group averages on the Whipple Reading Test were 19, 21, and 31 percentiles. Gains on the Iowa Silent Reading Test averaged 51 percentiles in comprehension and 41 percentiles for speed, approximately one-third greater than gains of 354 untrained freshman controls. The auditory pacing technique previously used exclusively for individual coaching is shown to be feasible for group use.

A Further Analysis of the Effects of Maze Reversal upon Subjects Reporting Different Methods of Learning and Retention. F. C. DAVIS, University of California at Los Angeles.

Objective evidence, presented in a previous paper, of the superiority of serial-verbal and visual-image methods, over a dominantly kinesthetic method of learning a high-relief finger maze, is supported by an analysis of data from recent experiments. Subjects reporting either a serial-verbal method or a visual-image method are nearer mastery when they make their first errorless tracing, and show less evidence of habit interference when asked to trace backwards a maze already learned, than subjects who report that they learn and retain the kinesthetic-tactual "feel" of the maze. In tracing again, in the forward direction, a multiple-U maze-pattern which they have just traced backwards, the serial-verbal and visual-image learners make reliably fewer errors than the kinesthetic learners. Experimental evidence is also offered in support of Tolman's concept of unconscious insight, in the specific case of the backward-tracing of a multiple-U maze-pattern.

A Tenth-Second Current Interrupter. (Demonstration.) KNIGHT DUNLAP, University of California at Los Angeles.

A small synchronous motor with two-pole electromagnet and twelve-pole armature operates in series with a five-watt lamp on

120 volt 60 cycle A.C. current. The armature shaft carries a two-phase commutator, on which bear 2 light brushes, providing 10-make-and-break cycles per second in a timing circuit to be supplied from a D.C. source for operating time markers, etc. Commutators giving multiples of 10 cycles per second may quickly be substituted if desired. Complete adjustment for wear, and simple replacement of parts, are provided.

Undertone Patterns in the Chirps of Young Roller Canaries. A. N. FARNHAM, University of Southern California. (Introduced by Milton Metfessel.)

Characteristic undertone patterns in chirps of young Roller Canaries were studied as they developed from day of hatching until 21 days of age. The young canaries were hatched and reared in sound-proof cages, the mother canary remaining with them for about 4 weeks. Data were collected by two methods: (1) During first few days while chirps were quite faint, phono-photographic records were made by means of the oscillograph. (2) After 12–14 days the chirps reached sufficient intensity to record on aluminum phonograph records. Photographic analyses of the records on aluminum were also made, the photographed notes were graphically analyzed, and the undertone pattern determined.

Continued Training with the Omission of Certain Nebenreize. PAUL R. FARNSWORTH, Stanford University.

In continuing a series of studies on the effects of altered Nebenreize on learning, groups of students were trained on the Koerth pursuit rotor and a Dearborn code test in the presence of a sound of about 70 decibels of loudness, one group of subjects (N, 100) being trained for one period and another group (N, 100) for two periods. The noise was obtained from a Duo-Art player piano roll which was perforated so as to yield a constantly repeated chord (c e g, at the level of c 1). During the following period one-half of the subjects proceeded with the noise present, and one-half with it absent. No significant nor consistent differences in the performance of the 2 groups appeared.

The Measure of the Degree of Determination of One Variable by Another. J. A. GENGERELLI, University of California at Los Angeles.

An attempt was made to solve Tryon's equation $r^2_{xy}=r^2_{cx}\,r^2_{cy}$, where r^2_{cx} is the degree of determination of the variable X by the

elements C which X and Y have in common, and r^2_{cy} is the degree of determination of the variable Y by the elements C which X and Y have in common. By appropriate manipulation, the equations

$$r^2_{cx}=\sqrt{\frac{r^2_{cx}}{r^2_{cy}}r^2_{xy}} \qquad r^2_{cy}=\sqrt{\frac{r^2_{cy}}{r^2_{cx}}r^2_{xy}}$$

are obtained. The problem resolves itself into finding an experimental value for the expression $\frac{r^2_{cx}}{r^2_{cy}}$. This has been attempted on the basis of the writer's "brain-field" hypothesis. Using the postulates expressed in the above hypothesis, it is deduced that the expression $\frac{F_y(I_y)}{F_x(I_x)}$ may be substituted for the expression $\frac{r^2_{cx}}{r^2_{cy}}$ and the expression $\frac{F_x(I_x)}{F_y(I_y)}$ may be substituted for the expression $\frac{r^2_{cy}}{r^2_{cx}}$. I_x represents the per cent improvement from zero to the physiological limit of improvement in variable X, and I_y represents the value obtained for variable Y. The functions F_x and F_y may or may not be identical. The above deductions are checked experimentally against other deductions implicit in the theory and are found to agree. The nature of the deductions and the experiments is described. Tables and curves are presented.

Spinal Cord Mechanisms Involved in Solving Problems in Sensory Discrimination: I. The Ability of Rats with Spinal Cord Lesions to Discriminate Differences in Inclined Planes. EDWIN E. GHISELLI, University of California. (Introduced by C. W. Brown.)

A six-unit inclined plane discrimination box was used for testing the rat's proprioceptive ability. The group of animals consisted of 41 blind vibrissaeless rats, 24 of which had various lesions in the spinal cord at the level of the first cervical vertebra, and 17 of which served as controls. The reliability coefficient of the apparatus, computed from the odd and even trials and corrected by the Spearman-Brown formula, was .98 for the operated animals and .90 for the control animals. During the initial learning period the true path was set at an incline of 20° and the blind alley at 0°. Difference thresholds of discrimination were obtained by increasing the incline of the blind alley at given stages until it approached 20°. The results indicate that there is no significant difference between the operated

and control animals either in rate of learning to discriminate or in the difference threshold for the discrimination of inclined planes.

Direction of Path as a Factor in the Rat's Choices of Short and Long Paths. HOWARD C. GILHOUSEN, University of California at Los Angeles.

Is There a General Learning Ability? CALVIN HALL, University of Oregon.

A review of the literature and original research by the writer yielded 90 correlation coefficients between various learning tasks. Two-thirds of these are not significantly different from zero, and six-sevenths are less than .5. A search for reasons which might account for the low magnitude of these coefficients revealed a dozen or more disturbing factors. Since it is doubtful that all of these factors can be satisfactorily controlled at the same time, the question put in the title is unanswerable. The practical implications of these findings are discussed.

The Association Between Brain Size and Maze Ability in the Rat. J. A. HAMILTON and N. W. SHOCK, University of California.

A Factorial Analysis of the Responses to an Annoyance Inventory. CHARLES M. HARSH, University of California. (Introduced by R. C. Tryon.)

The statistical or clinical analysis of individual differences in personality traits, as they are measured by inventories, should be aided by more adequate subdivision of the inventory items. In a study of the mechanics of such categorization 341 items of an Annoyance Inventory were subdivided into types of situations on the basis of the judgment of 200 persons. Subsequently obtained self-ratings of the inventories were then analyzed with reference to these categories of situations. The extent of a person's annoyance to any given item was measured on a five-point scale. The average extent of annoyance for items of each category was then compared with the average for each of the other categories, as well as for the entire inventory. The reliability of these sub-scores indicates that the subdivision of items is justifiable as well as useful. A factor analysis by the abbreviated Thurstone method serves as an aid in demonstrating the variety of factors which contribute to these inventory reports of annoyance, and also shows the extent to which one can assume the operation of a general factor or trait of annoyability.

Comparative Thresholds of Audition in the Rat. FRANKLIN HENRY, University of California. (Introduced by C. W. Brown.)

An eight-unit linear auditory maze was constructed which yielded an uncorrected reliability of .98, and which made use of known and reproducible stimulus values. Experimental evidence was secured with this apparatus which seems unquestionably to establish the ability of the rat to learn to discriminate pure tones. It is apparently difficult or impossible for the rat to establish a discrimination habit for a pure tone of 1,000 cycles, even when it is quite loud, but the introduction of harmonics makes the discrimination possible. At 4,000 and 8,000 cycles, a relatively pure tone can be discriminated. The absolute intensity threshold for discriminating a 4,000 cycle tone is found to be high as compared with that of the human subject and tends to approach human threshold at 8,000 cycles. The auditory thresholds of 22 animals were determined. Differential intensity thresholds were also determined, and found to be high as compared with human discriminatory limits.

Visual Size Constancy as a Function of Kinesthetic Cues in Binocular and Monocular Accommodation and Fixation. THOMAS G. HERMANS, University of Washington.

Two similar objects different in size yet placed at such distances as to subtend the same angle in the visual field, thereby yielding identical retinal stimulation, are perceived as different in size; the farther object is perceived as larger. This phenomenon, known as size constancy, Köhler uses to demonstrate his theories of cerebral dynamics. He fails to note that a major factor in the synthesis may be the kinesthetic cues from muscular adjustments of the eyes; he considers only the retinal stimulation. He also implies falsely that this phenomenon is observable with single objects in isolation. The writer presents a series of demonstrations showing that size constancy is a function of kinesthesis in binocular and monocular accommodation and fixation of two or more objects when compared as to size. An experimental comparison of the relative efficacy of binocular and monocular cues in the production of this illusion is given.

Sources of Confusion in Attempts to Relate Conditioning and Learning. ERNEST R. HILGARD, Stanford University.

The chief source of confusion lies in the misunderstanding of facts regarding conditioned responses. Quotations selected from the writings of Guthrie, Hull, Sandiford, Thorndike, Tolman, and others assume diametrically opposite facts to be true of conditioning; not all

can be equally accurate. While oversimplification of the conditioned reflex formula is in part responsible for misinterpretations, lack of sufficient experimental data is a more important handicap to precise statement. It is contended that factual inaccuracies are at present more largely responsible for disagreement among writers in this field than are the conflicts arising out of the nature of their psychological systems. Records from conditioning experiments illustrate the possibility of reconciling apparently contradictory points of view.

Studies in the Sensory Basis of the Maze Habit: III. The Rôle of Extra-Maze Auditory Stimuli. C. H. HONZIK, University of California.

When a fourteen-blind elevated maze was rotated 180° late in learning, 2 groups of blind rats showed considerable disturbance in performance. A group of 52 blind-deaf rats whose maze was rotated did not show such disturbance. It was concluded that the change in direction of extra-maze sounds following maze rotation was the cause of the disturbance. Two alternatives were possible: extra-maze sounds may have been essential to normal learning, or these sounds may not have been essential but any change involving them might have caused a distraction which would account for the disturbance in performance. A group of 45 blind rats trained on a maze that was rotated 90° or 180° for each trial showed considerable retardation as compared with a group of blind rats on a stationary maze. It was concluded that extra-maze auditory stimuli play an essential part in the learning of blind rats on an elevated maze.

Intercorrelations of the Components of Temperament Measured by the Humm-Wadsworth Temperament Scale. DONCASTER G. HUMM, Los Angeles.

The 7 components of temperament measured by the Humm-Wadsworth temperament scale have been intercorrelated, in order to determine the frequency with which each component occurs in combination with every other. Partial correlations have been computed to the fifth order ($r_{12.34567}$). The quantitative analysis of each component as revealed by the answers of the subjects tested is in general agreement with the description of these components given by Rosanoff in his "Theory of Personality". The correlations show that the components occur in combinations which might be expected from psychiatric experience. On the whole, except for that between the manic and depressed components, the correlations are not high. In some cases they are considerably less than chance.

The Applicability of the Grace Arthur Performance Scale to an Adolescent Group. KATHRYN A. HUMM, University of Southern California. (Introduced by J. W. Todd.)

The Arthur Point Scale of Performance Tests was administered to 58 junior high school pupils, all from the B7 grade, ranging in chronological age from 11 years–6 months to 13 years–6 months, and in mental age (by Terman group intelligence test) from 11 years–0 months to 14 years–6 months. By the Arthur scale, their mental ages ranged from 8 years–6 months to 20 years. The correlation of mental age between the 2 tests, with chronological age partialled out, was found to be $+.629 \pm .054$ (not corrected for homogeneity). Correlations between the Terman group test and the separate tests of the Arthur scale ranged from $-.125$ to $+.584$. It was found that at least 4 of the tests comprising the scale are too easy to be used upon subjects of this age range, since from 19% to 45% of the subjects achieved maximum or nearly maximum scores in these tests.

A Behavior Maturity Rating Scale for Nursery School Children. WALTHER JOËL, Los Angeles.

This scale measures "behavior maturity" as exemplified by arbitrarily selected symptomatic behavior items. It deals not with "traits" but with dynamic behavior. Statements of specific reactions to concrete situations are used. Each child is rated, not by comparison with other children, but independently. Norms obtained from 1,200 nursery school children in California offer a basis for comparison. The scale furnishes a profile of 20 aspects of behavior as well as a single quantitative measure of "behavior maturity" (Behavior Maturity Index).

The Growth Study as a Psychological Method. H. E. JONES, University of California. (Address of the Retiring President of the Western Psychological Association.)

Leisure Time Activities of Adolescents. MARY C. JONES, University of California.

An Experimental and Clinical Evaluation of the Concept "Nervous Instability". BARNEY KATZ, University of Southern California. (Introduced by Robert H. Seashore.)

If there is a general factor of "nervous instability", then persons who exhibit extreme types of emotional disturbance should also show other evidences of instability, such as nervous tremor. To test this hypothesis, the writer arranged to study 25 boys who were considered

the most severe temper tantrum cases in an institution for juvenile delinquents and to compare them with a more even tempered group of the best athletes from the same age and intelligence ranges. Both groups were given the standard test procedure for measurement of arm-hand steadiness by means of the Seashore photoelectric tremor register. The fact that there was no significant difference between the steadiness scores of the 2 groups suggests that nervous tremor is not determined by the same factors affecting emotional tantrums, and that the term nervous instability must be analyzed into more specific factors by means of similar experiments in other factors usually grouped under this loose term.

Adjustments of Under-Age Students in High School. NOEL KEYS, University of California.

This study, made by Miss Lucile Wester under direction of Professor Keys, is the second of a series dealing with the advisability of rapid promotion for very bright pupils. One hundred and thirteen boys and girls graduating from Oakland high schools in 1934 and 1935 from 1 to 3 years younger than normal were studied. Forty-six, ranging in I.Q. from 120 to 138, were matched with controls of the same sex, I.Q., school class, and occupational status of father, but 19 months older. The younger pupils earned more scholarship honors, took part in more activities, and were elected to more class offices. Even on football teams, the under-age boys placed more often than the controls. Personality difficulties were not common, and shyness and timidity characterized the control group much more than the under-age. The few cases of serious problem behavior proved to be either bright but non-accelerated controls, or accelerated pupils of only average intelligence.

A Study of the Incidence in Six Populations of Neurotic Responses to Items of the Thurstone Personality Schedule. G. KUZNETS and R. C. TRYON, University of California.

The percentages of neurotic responses to each item of the Thurstone Personality Schedule in 6 populations were used as a basis for determining items differentiating sex and locale. The data on Texas men (Harvey), Pittsburgh women (Munn), and husbands and wives (Willoughby) were obtained from published reports. Data were also obtained on 200 women and 102 men University of California students. More college women were found to give neurotic responses to items dealing with fears, impulsions, moods, and affects than men, but more college men responded in a neurotic manner to items per-

taining to feelings in social situations. Thurstone's simplified multiple factor method was applied to correlations between neurotic percentages in the 6 populations. The first 3 factors may be described as (1) factor (or factors) common to all populations but most heavily weighted in the California groups, (2) "neurotic homogamy", and (3) sex.

Spinal Cord Mechanisms Involved in Solving Problems in Sensory Discrimination: III. The Ability of Rats with Spinal Cord Lesions to Discriminate Runways Differing in Tactual Discrimination. DONALD LOVETT, University of California. (Introduced by C. W. Brown.)

Elevated runways covered with sandpaper are used for measuring the rats' tactual ability. Each unit consists of a choice point and 2 pathways, 30 inches long and diverging at an angle of 30°. These pathways are covered with sandpaper differing in texture by a known amount. The pathway selected as the blind is blocked at the far end, the other pathway leading to a short runway which returns the rat to another choice point or the food box. A measure of the rats' tactual discrimination threshold may be obtained by systematically varying the differences between the grades of sandpaper used on the blinds and the true pathway. Six units arranged linearly have given a reliability coefficient of .82. Several controls have been set up to prevent the rat from using stimuli other than tactual cues. Visual stimuli are eliminated by using blinded rats. Spatial habits are minimized by changing the right-left relations of the true pathway for each trial. Olfactory cues are taken account of by changing the sandpaper often, and by interchanging the wooden parts used for the blinds and the true pathway. A group of normal animals and a group with spinal cord lesions have been trained on the apparatus. No significant differences were found between the operated and control animals either in rate of learning to discriminate or in the difference threshold of discrimination.

Frequency of Problem Behavior in a Normal Preschool Sample. JEAN WALKER MACFARLANE, University of California.

The highly divergent figures presented in the literature relative to the frequencies of problem behavior are due largely to, first, variation in the samples studied, second, varying definitions as to what is regarded as problem behavior, and third, varying clinical technique. This paper presents frequency figures for explicitly defined behavior found cumulatively among a representative preschool sample during

the five-year period. Some problems tend to increase with age, others to decrease with age, others reach a peak and subside, while others persist irrespective of age. In view of these facts incident figures from problem clinics should be presented by age levels. These age line figures offer material which should help to estimate the standing of any given child with respect to a fairly normal sample relative to 63 items of behavior apparently regarded as atypical or problem in nature. Additionally certain problems occur so often in this normal sample that they cannot be considered atypical as generally assumed.

An Outline and Objective Examination in the Field of Abnormal Psychology. ELEANOR M. MAGNUSSON, University of Southern California. (Introduced by Robert H. Seashore.)

Present day texts in abnormal psychology are of such recent origin as to differ greatly in subject matter. Since a thorough survey of the field for advanced students calls for a collection of the best materials available on each topic, this study has attempted to outline the major topics discussed in leading contemporary texts and supplementary sources. Such an outline should be valuable to both teacher and student by organizing and enriching a course, and by indicating appropriate references and illustrations for each topic. In addition, a list of several hundred concepts is appended, together with definitions. For convenience the list is divided into a "basic" group most necessary for the student in organizing his own thinking in the subject, and a supplementary list likely to be encountered in the literature. An objective examination, classified by topics, is built up from representative samplings of the outline of topics, for use in teaching and appraisal of work done in the field, *e.g.*, final or graduate examinations.

Negativistic Reactions of Preschool Children on the New Revision of the Stanford-Binet. BARBARA A. MAYER, Stanford University. (Introduced by M. A. Merrill.)

In a study of 277 preschool cases used in standardizing the forthcoming New Revision, age is found to be an outstanding predisposing factor for negativism in the test situation. Negativism is manifested fairly constantly from 2 to 4½ years, decidedly less thereafter, most frequently at 3 years, most actively between 3 and 4½. The proportion which can be overcome increases consistently. No significant difference between sexes appears. The amount of negativism a test elicits ranges from 31% to none. Most negativism is aroused by tests requiring verbal response to purely verbal stimuli, then verbal

response to pictures, and repetition. Tests involving objects or performance responses are readily accepted, indicating that the demand upon spontaneous and not delimited association is an important factor. No relationship appears between difficulty of the test and negativism. Negativism is likely to appear on the first rather than second examining. The mean score is larger for the less than more resistive group.

A Preliminary Study of Some Esthetic Aspects of the Song of the Roller Canary. HARRISON MUSGRAVE, University of Southern California. (Introduced by Milton Metfessel.)

In connection with Dr. Metfessel's study of the native song of the Roller Canary, it was found advisable to develop an objective scale by means of which their song might be rated. To this end, recordings were made of prize winning birds from several Roller Canary contests. Parts of these and other recordings were scored by several accredited judges. The parts so scored were then strobophotographed, and a rating scale constructed in terms of pitch changes and time relationships for several typical tones.

An Outline and Objective Examination of Basic Concepts and Methods in Experimental Psychology. FAY NYLANDER, University of Southern California. (Introduced by Robert H. Seashore.)

This study is one of a series of organizing outlines and examinations for special fields of psychology, of which the first was by F. McCollom on historical psychology. The study aims to collect and organize a list of concepts and methods important for experimental psychology, giving definitions, illustrations, references, and objective examination questions on each topic. The advanced student and teacher may employ this outline in planning a course of study and in systematically preparing for various types of examinations in the field.

Individual Differences in Response to Stair Climbing in Children and Adults: II. Pulse Rate and Blood Pressure. ERIC OGDEN and N. W. SHOCK, University of California.

Following running up 17 meters of stairs as fast as possible (30–50 seconds) the pulse rate and systolic blood pressure are, as might be expected, well above the resting values, while the diastolic pressure is depressed, and in some cases very markedly so. During the recovery, which is about 75% complete within the first 7 minutes, there is a progressive diminution in pulse pressure and pulse rate, the product of these following a curve somewhat similar to that of the excess oxygen consumption. This function has been considered

by some authors representative of the cardiac output and in our experiments its curve follows roughly Lindhardt's curve [1] for cardiac output after intense exercise, although neither Lindhardt nor the present authors got satisfactory measurements during the first minute of recovery when all the cardiovascular functions are presumably changing rapidly. The cardiovascular measurements do not return to the basal values within a half hour, but at this time the pulse rate is characteristically high and the pulse pressure somewhat low. There are individual differences in the magnitude and timing of the diastolic pressure changes. These may be interpreted as variations in rate and extent of arterial reactivity. Most of the subjects are boys, and it was noted that boys characteristically recover their metabolic equilibrium more rapidly than the girls following exercise.

Ten Thousand Eugenic Sterilizations. PAUL POPENOE, Pasadena, California.

California state institutions have sterilized more than 10,000 insane and feebleminded patients during the past 26 years, under the state law for eugenic sterilization. An exhaustive study of the results is now under way, as a collaboration of the Human Betterment Foundation and the California Bureau of Juvenile Research. Operations are evenly divided between the two sexes. Two-thirds of the total are on mentally diseased patients, one-third on the mentally deficient. About half of all the mental defectives who have been paroled have had sterilization. Among the psychotic, only one new admission in every 5 or 6 is selected for sterilization. The results of sterilization seem to be satisfactory to all concerned.

The Effect of Emphasizing Responses in a Discriminatory Learning Problem. MARJORIE K. PYLES, University of California. (Introduced by J. W. Macfarlane.)

At the National Child Research Center, Washington, D. C., a study was made of the effect of emphasizing children's responses in a form-discrimination problem by means of sound stimuli. Two groups of 20 preschool children, matched with respect to sex, age, and I.Q., were given practice in matching differently-shaped tiles (circle, crescent, triangle, quadrilateral, and pentagon). One group heard a differential sound stimulus on matching each tile (regardless of whether or not the response was correct); the other group heard only the sound of the tiles falling into a cardboard box. A negligible difference in the number of errors made by the 2 groups was noted

[1] Lindhardt, J., *J. Physiol.*, 1923, **57**, 17.

at the beginning of learning, but this difference increased steadily with practice until on the twentieth or last trial, the group whose responses were "emphasized" made half as many errors (11 *vs.* 24) as the group whose responses were not so emphasized. It was concluded that emphasizing responses by means of sound stimuli had a facilitating effect upon learning.

We Study Life: Adventures of Psychology 104. WILLIAM H. ROBERTS, University of Redlands.

A course in developmental psychology aroused great interest among upper division undergraduates. It dealt with heredity, infancy, childhood, adolescence, sex, marriage, maturity, senescence, typical conflicts and disorders at each stage of development. The paper sketches very briefly the points of view developed in connection with the topics mentioned and some of the reactions of students to such views. The author believes that the course aided students to understand their own problems, made them more tolerant, and was especially valuable for teachers.

The Genetic History of Intelligence with Special Reference to the Etiology of Mental Deficiency, Based on a Study of Twins. AARON J. ROSANOFF, University of Southern California.

Hereditary factors determine the maximal potentiality of intellectual development. For a full realization of this potentiality the following conditions are requisite: (1) That in the germinal period there shall be no damage to the ovum, such as may result in mongolism. (2) That in the embryonic period there shall be no pathology such as may cause meningocele, encephalocele, or other maldevelopment affecting the cranial contents. (3) That in the fetal period there shall be no pathology such as might result in interference with growth, premature birth, or necessity for forced delivery. (4) That in the process of birth there shall be no pelvic deformity, abnormality of presentation, or other condition necessitating rough obstetrical manipulation, such as may result in cerebral birth trauma. (5) That in infancy or childhood the subject shall suffer no attack of meningitis, encephalitis, or other cerebral disease or injury. (6) That in childhood and adolescence there shall be exposure to such home, school, and social environment as would be adequately stimulative of intellectual development. Almost all cases of mental deficiency below the level of moronism and all those complicated with infantile palsies, epilepsy, and some other conditions, are of non-hereditary origin. A very large percentage of the higher grades of mental deficiency are also of non-hereditary origin.

Improvability in Pitch Discrimination. ROBERT H. SEASHORE, University of Southern California. (Visiting Professor.)

Two hundred laboratory students were tested twice on the Seashore phonograph record test of pitch discrimination, and the 12 least accurate observers (all below 12th percentile rank) were selected for an intensive training study. All observers made some mistakes in discriminating a difference of 30 vibrations from the standard of 435 v.d. When tested individually by tuning forks, tunable bars, and a special General Radio audiometer their average threshold was 9 v.d. After 3–9 hours of diagnostic *individual* training the thresholds averaged 5 v.d. and several were 1 v.d. or better. Although this is considerable absolute improvement, a retest on the phonograph record showed an average rise of only 21 percentile ranks. This may be due in part to the difference between the two types of tests, and further studies on transfer of training are under way. Another group of better observers also made progress. The improvability of "aptitude" measures is considered in relation to use in vocational prediction.

A Method of Recording Minute and Obscure Movements. ALICE BALL STRUTHERS, University of Southern California. (Introduced by J. W. Todd.)

The desirability of a practical and efficient means of recording delicate and minute movements led to an investigation of various mechanical and electrical devices that have been used. The investigation resulted in the discovery of a method of applying a heated marker to a waxed stylographic paper. The marker point is affixed to a pivoted lever arm and to a transfer mechanism. When the paper is placed on a polygraph with a plate glass or other smooth surface and moves under the heated marker point, a fine clear record is produced. The details of the transfer of movement from the original source and the amount of its magnification depend largely upon the particular movement to be recorded. The successful transfer of graphs of minute tonus changes occurring in the quadriceps muscle illustrates the effectiveness of this new and simple device. The fact that it may be used simultaneously with the recording or other performances is significant.

The Effect of Time Interval on the Reliability of ACE Psychological Examination Scores. H. R. TAYLOR, University of Oregon.

The use of individual scores on college aptitude tests presupposes that changes due to growth and practice effects in taking such tests are negligible in comparison with differences between various indi-

viduals in such ability. The effect of various intervals of time between retests on both absolute scores and relative rank within a college group has been evaluated. The effect of variations in physiological conditions and emotional attitude has been studied by correlating gains in score on each of the 5 parts of the tests. This seems to indicate that the factors responsible for gains are specific for each individual test. There was little evidence that students making low scores on the original test tend to make above average gains on this test. In fact, when corrected for the spurious negative effect of chance factors, gain correlates positively to a very slight degree with initial score. Moreover, the original tests correlate nearly if not quite as high with college scholarship as the retests do. Finally, the implications in regard to the fineness of the categories which should be used in discussing with students the results of a single college aptitude examination are considered.

Individual and Sex Differences in Certain Motor and Verbal Reactions. J. W. TODD, University of Southern California.

Are there qualitative and quantitative differences of response, in exactly duplicated situations, that with reliability may be ascribed to the fact of being male or female? To answer this question, series of motor and verbal reactions were obtained from groups of students of sophomore standing. The traits examined were reaction time under chronoscope instrumentation, reaction time by the group pencil-tapping method, checked individually by means of an electric tapping-board, and word-naming by the transcription and oral-serial methods. A qualitative study of the transcribed and spoken words, as respects concepts represented and syllable number, together with free-association trends, was made. Groups of control subjects from junior and senior standing were examined under exactly duplicated conditions, as well as 2 groups of employed and unemployed female clerical workers. In the sophomore groups, the influence of the factor of general intelligence on qualitative and quantitative word-naming and reaction times was an important phase of the project.

Sex Differences in Children's Opinions of Each Other. CAROLINE MCCANN TRYON, University of California.

Children's ratings of each other on 20 personality traits were analyzed by intercorrelational and factor analysis techniques (Thurstone's Center of Gravity Method). The data were obtained on approximately 340 high sixth- and low seventh-grade children, using a questionnaire similar to the Hartshorne and May "Guess Who

Test". Analyses were done for boys and girls separately. Many of the intercorrelations and also the weighting of items in the factors showed marked differences between boys and girls. Assuming that a large amount of the intercorrelation was due to "halo", the experimenter interprets the first factor as indicating that the boy who is idealized by his fellows is one who is cheerful, very good at games, and aggressive, one who likes a fight, takes chances, and tends not to behave in the classroom. The prototype of the ideal girl is different: she tends to be quiet, unaggressive, conforming, friendly, pretty well groomed, etc. Each of the remaining factors secured from the analysis is described.

A Graphic Method of Fitting Pearsonian Curves to Observed Non-normal Frequency Distributions, and the Transmutation of These into the Normal Curve. ROBERT C. TRYON and G. KUZNETS, University of California.

The Effect of Fatigue on Priority of Bilateral Manual Movements. NEIL WARREN, University of Southern California.

The leading hand in attempted simultaneous bilateral movements has been used as an indication of "native handedness", on the assumption that the precedence is determined by a "central laterality". Several studies have shown that the hand not used in writing consistently moves first. Two explanations suggested are (1) the slower response is a characteristic of bilateral dominance, or (2) the prior movement results from an overcompensation by the less-used hand. The apparatus used in this study was a device which indicated the leading hand in an attempt to press 2 telegraph keys simultaneously. Consistently earlier movements were made (1) by the hand not used in writing, and (2) by the less-used finger when the forefinger of one hand was paired with the little finger of the other hand. That these prior movements are due to overcompensation is indicated by the data on the effect of fatigue. The finger fatigued by manipulating an ergograph was found to move earlier than the finger not experimentally fatigued.

An Experimental Analysis of Factors Related to Hand Steadiness. ALLEN J. WATSON, University of Southern California. (Introduced by Robert H. Seashore.)

Eighty college men and women were tested for 6 trials of 1 minute each, for each hand, on the new Seashore photoelectric tremor register. Results thus far indicate that: (1) the reliability (trials 3 and

4 *vs.* 5 and 6 for each hand) is approximately .87 (uncorrected); (2) the intercorrelation between right and left hands is high; (3) women are slightly steadier than men on this test; (4) moderate smokers are, if anything, slightly steadier than non-smokers (but this may be due to other factors, such as selection); (5) subjects were slightly steadier with their non-preferred hand; observer changed hand after each trial; (6) there was no significant correlation between this type of steadiness and scores on 2 tests believed to measure emotional or nervous "instability" (Manic-Depressive ratings on Humm-Wadsworth Tests; neurotic scores on Bernreuter Test).

Gestalt Psychology in the Light of History. R. H. WHEELER, University of Kansas.

An intensive historical study of the sciences, philosophy, and social trends based upon 6,000 references, reveals the existence, common to all phases of human endeavor, of accelerating cycles. Peaks of "whole-mindedness" occur around the dates 300 B.C., and 1250, 1650, 1820, and 1935 A.D. "Part-mindedness" dominates midway between these dates, coincident with social revolutions, imperialism, and empiricism. The roots of Gestalt psychology, together with relativistic physics and organismic biology, trace back largely through previous eras of "whole-mindedness". These periods coincide with dictatorships and depressions and with temporary periods of peace. The cycles are diminishing in amplitude and duration and it is possible that for the first time in history a single generation will span a complete cycle. Solving the part-whole problem in science and the discovery of the laws of the social structure are one and the same problem. A twenty- to thirty-year period of confusion, warfare, and scientific quarrels is predicted by the culture cycles, unless leadership can understand and control them. It is important that Gestalt psychology be understood as an aspect of cultural history.

Psychological Factors of Drug Addiction: A Two-Year Study of 1,500 Narcotic Offenders. D. P. WILSON, Los Angeles.

This research was made at Fort Leavenworth under the Division of Mental Hygiene, United States Public Health Service. The conclusions of this paper are based upon a preliminary report and comprehensive monograph submitted for publication. Brief general background data are presented concerning denarcotization, drug usage, dosage, age, reasons for "habit", etc. Special reference is made to groups isolated for personality study. Conference histories also throw much light upon the mechanisms, emotional instabilities, proc-

esses, and blockings of the susceptible personality. Indications show much similarity between the drives of the alcoholic and addict. The problem was attacked from several angles instead of merely confining the study to a large battery of so-called personality and neurotic scales. Valuable insights into prevention and possible psychotherapy are largely due to this multiple approach.

Teaching, Research, and Academic Advancement. WILLIAM R. WILSON, University of Washington.

On two different occasions the 7,000 students of a university rated each of their teachers and courses on a scale describing 22 different traits. Evidence on the validity and reliability of the ratings was secured. The relation of teaching and effectiveness as judged by students to academic rank, age, salary, experience, and research productivity was obtained. A comparison was made of the rate of academic advancement of the best and poorest teachers. By pairing each of the outstanding productive scholars of the university with a colleague from the same department who has published nothing or almost nothing, the relative rate of advancement of the 2 groups is secured. The possibility of using the information thus secured in the improvement of teaching and of modernizing the personnel methods of the university are discussed.

The Physiological Maturation of Young Chimpanzees. JOSEPH G. YOSHIOKA, Anthropoid Experiment Station, Yale University.

Six young chimpanzees varying in age from birth to 8 years were studied daily under standard conditions for 4 years for body temperature, pulse and respiratory rate. Throughout the period of study temperature varied least and showed relatively little effect of age. Individuals had their own level of temperature and the monthly variability differed from .2° to .3° C. Both the pulse and respiratory rates, starting high in early days, decreased gradually as the animals matured. The former decreased relatively more than the latter. The variabilities of both pulse and respiration decreased likewise. The greatest changes were observed toward the end of the first year. The ratio between pulse and respiration, however, remained relatively constant. Therefore, it is said that the physiological maturation noted from these measurements consists in the gradual establishment of stability of these vital functions under varying external conditions.

PROCEEDINGS OF THE SIXTH SPRING MEETING, NEW YORK BRANCH, AMERICAN PSYCHOLOGICAL ASSOCIATION

HERBERT W. ROGERS, SECRETARY, LAFAYETTE COLLEGE

The Sixth Annual Spring Meeting of the New York Branch of the American Psychological Association was held on Saturday, April 13, 1935, at Princeton University, Princeton, New Jersey. It was attended by 279 persons, 137 being members and 142 guests.

The papers presented in the scientific program were arranged by the Program Committee in five sections as follows: Comparative Psychology, Child and Differential Psychology, Physiological Psychology, Experimental Psychology, and Social and Abnormal Psychology.

Since this year's meeting was held away from New York, a luncheon, rather than dinner, was held at the Graduate School. Following the luncheon Honorary President Joseph Jastrow delivered an address on *The Chaos in Psychology.*

The annual business meeting was held immediately following the Honorary President's address. Since there were but fifteen minutes before the beginning of the afternoon program proposed changes in By-Laws were postponed until next year. Transactions were briefly as follows:

1. *Secretary-Treasurer's Report:* Read and voted accepted (bank balance, April 12, 1935, $350.72).

2. *Elections:* Honorary President, 1935–1936, Herbert S. Langfeld, Princeton; to Board of Directors, 1935–1938, Arnold Gesell, Yale and Samuel W. Fernberger, University of Pennsylvania.

3. *Committees Appointed: Program,* M. S. Viteles, Pennsylvania, Chairman; C. W. Bray, Princeton; G. W. Hartmann, Pennsylvania State. *Nominating,* J. W. Dunlap, Fordham, Chairman; H. Helson, Bryn Mawr; T. M. Abel, Sarah Lawrence.

4. *Next Meeting:* Invitation to hold next Annual Spring Meeting at Fordham University, New York, was voted accepted.

5. *Treasury:* It was voted that $100 be set aside and deposited in a savings bank.

6. *Territory:* The Honorary President appointed a committee,

consisting of Dr. P. S. Achilles (Chairman), C. L. Hull, and H. W. Rogers to report upon the territory which it might be advisable to include in the N. Y. Branch.

7. Cordial thanks to Princeton University, to the Committee on Local Arrangements, and to the members of the department of psychology at Princeton University were voted.

8. *Adjournment:* Voted at 3:00 P.M.

Brief abstracts of the papers presented in the scientific program follow:

Comparative Psychology

Chairman, C. J. Warden

Taste Sensitivity in the White Rat. Carl H. Wedell, Princeton University.

The taste sensitivity of the white rat was investigated by the preference method. Individual white rats were given the choice between drinking a solution of quinine sulphate and tap water. Both solutions were present for a period of from 15 to 20 hours a day. Temperature and olfactory differences were eliminated, and the formation of position habits was prevented.

When the concentration of the sulphate solution was as high as .05 per cent by weight, the animals drank 20 to 50 times as much water as quinine sulphate. As the concentration was decreased, a point was reached where the ratio, water drunk to quinine drunk, dropped suddenly to a value varying from 3 to 6 in different animals. Possible explanations for this phenomenon are suggested.

Upon further dilution of the quinine, the amount consumed increased until equal amounts of both solutions were drunk. If the threshold is arbitrarily defined as that concentration at which the rat drinks twice as much water as quinine sulphate, then the thresholds of 6 rats were the same as the human threshold, and the remaining 6 thresholds were slightly higher.

A Method of Studying the Modifiability of the Stereotropism in the Albino Rat. Hughbert C. Hamilton and Harry H. Matlack, Jr., Temple University.

This is a preliminary study concerned primarily with working out a method of studying types of the tropistic behavior in the albino rat. The behavior studied was the tendency of the rat to spend most or much of its time in physical contact with other rats, when in a living cage. The specific problem was to determine if this tendency could

be broken down, and if so, whether the change would be temporary or permanent.

A technique was developed which made it possible to give an experimental animal an electric shock when it came into contact with one of the other animals in the cage without the other animals receiving any shock. The experimental animals were segregated from the main group and from each other. After a long period of segregation, each experimental animal was given a definite period of time per day in the cage with the group of stimulus animals. Each time he made contact with another animal he received a shock. This continued for 27 days, by which time all experimental animals had learned to avoid the other animals. The test periods were then continued for 9 days with no shock given, and after a time the animals were beginning to approach the others more and more. Control animals were used.

It is concluded that this method of studying tropisms is suitable for use with rats. Conclusions as to the behavior of the animals are not justified because of the small number of animals used, but the results suggest that the stereotropism can be broken down or overcome by conditioning, but that the change is probably not permanent.

Color Constancy in the Rhesus Monkey. NORMAN M. LOCKE, Columbia University. (Introduced by C. J. Warden.)

The phenomenon of color constancy was studied in 4 Rhesus monkeys and measurements were made in which illumination, shadow, and complexity of the visual field were varied. The results under these various conditions give the first quantitative measures of color constancy in the lower primates.

The experiment was carried on with the same technique as is used with human subjects, and equations were made by human subjects under the same conditions as with monkeys. These are presented for direct comparison.

The theoretical explanations of color constancy can conveniently be grouped into 2 categories: those which favor an emphasis upon the perception of illumination, and those which favor a pattern or relationship explanation. As the conditions of the experiment fulfill the requirements of both theories, suggestive findings are presented.

The Visual Acuity of the Cat in Relation to Discrimination Distance. KARL U. SMITH, Brown University.

A controlled method is described which permits the determination of the visual acuity of the cat as a function of the distance of the test

stimuli (a single horizontal line *versus* a single vertical line) from the point at which the animal is required to discriminate.

In a first series of experiments, 2 experienced animals were trained in response to lines 0.64 cm. in width, and the discrimination distance was thereafter progressively increased from 46 to 106 cm. in steps of 10 cm. The line width was kept constant. Both animals failed to give consistent responses at distances beyond 96 cm. In a second group of experiments, specific training was carried out, when necessary, at 4 different discrimination distances (50, 75, 100, and 125 cm.), and the minimum effective visual angle determined at these distances. This angle was found to vary between 1 min., 8 sec. to 3 min., 17 sec. for one animal and 27 sec. to 1 min., 23 sec. for the other. In the case of each animal the acuity of vision was approximately the same at both 50 and 75 cm. discrimination distance. However, there was a marked decrease in acuity at 100 cm. and above, the point at which both animals failed to respond consistently as the discrimination distance was increased with constant width lines.

It is concluded that the most effective range of accommodation in the cat is limited to 100 cm. In general, the measured visual acuity of the cat corresponds more closely to that of animals in possession of a fovea than it does to that of organisms lacking such a differentiated retinal area.

Visual Thresholds of Real Movement in the Cat. JOHN L. KENNEDY, Brown University. (Introduced by L. Carmichael.)

Two lever discrimination boxes were devised to present a revolving cross of 9.5 cm. radius and a non-moving cross of the same dimension in 2 different stimulus relations: (1) black crosses on an illuminated ground; (2) illuminated crosses on a black ground. In order to obtain a food reward, the animal was required to depress a lever beneath the moving stimulus.

Using stimulus (1) with the dark-adapted eye, 6 cats were required to discriminate when the moving cross was made to revolve at an initial speed of 80 degrees of central angle per second. Four animals fulfilled a criterion of 90% correct choice of the moving cross in 40 trials, requiring, respectively 220, 240, 320, and 480 trials (including criterion trials). Two animals failed to respond discriminatively within approximately 500 trials. Thresholds (2.9 to 14.6 degrees of central angle per second) secured by reducing the speed of the moving cross are compared to those obtained on albino rats trained to discriminate between a moving and a non-moving black and white grating.

Three of the animals which learned stimulus (1) were presented with stimulus (2). Transfer was found to be almost immediate, since a significant level of correct choice was reached by all 3 animals within 40 trials. It is concluded that in respect to relative independence of luminosity relation between figure and ground, the discrimination of movement in the cat presents characteristics similar to those of the discrimination of form.

The Behavior of Cats on Several Problems in Association. C. N. WINSLOW, Brooklyn College, and D. K. ADAMS, Duke University.

Although the ability of the cat to form the association between the manipulation of a mechanical device and the securing of reward has been the subject of several researches, little is known of its ability to form the association when the cause and the effect are widely separated both temporally and spatially. In this investigation 3 specific problems were under consideration: (1) Is the cat able to distinguish directions when a simple mechanical device (a platform to be pressed) is moved to the different sides of the experimental room? (2) Is it able to recognize the same problem device when it is included as a part of a larger configuration? (3) Is it able to shift its manipulative act from pressing a little platform to lifting up a ring?

A reward of liver was given for each successful act. A heavy cover over the liver was removed through an electric circuit which was closed when the animal pressed the platform or lifted up the ring. The norm chosen was 4 successful responses out of 5.

One cat could not master even the first problem set, that of pressing the platform at the east side of the room. The other 2, however, were successful in distinguishing the different directions of the room in which the platform was placed, and pressing the platform when it was contained in the larger configuration of a box to which it was fastened in an inverted position. Both failed on the problem of lifting the ring on the box. One of them almost consistently used the fore-paw, the other its nose, in the manipulative response.

The Limits of Learning Ability in Cebus Monkeys. A. M. KOCH, Columbia University.

Six young cebus monkeys were trained in the Jenkins problem apparatus in order to determine their limits of learning. The problem consists of depressing one or more plates in the floor of a problem box. Starting with a single plate, the complexity of the response was gradually increased by adding plates one at a time until the

series was extended beyond the animal's ability to learn. As soon as an animal reached the criterion of 9 perfect trials out of 10 it was advanced to the next step, *i.e.*, another plate was added to the series.

The data obtained in connection with this experiment were divided into 2 classes (for the sake of convenience), learning data and activity data. Under learning data are included trial, error, and time scores. Under activity data are included all of the scores representing a more detailed analysis of behavior.

The number of monkeys which reached the limits of learning on the various steps follow: Step V, 1 monkey; Step VI, 1 monkey; Step VIII, 1 monkey; Step XI, 1 monkey; Step XIV, 1 monkey; Step XV, 1 monkey.

The range in steps was 5–15, the median was 9.5, and the average 9.8.

Comparisons of learning ability, on the same apparatus, were made between cebus monkeys, rhesus monkeys, kittens, rats, and guinea pigs.

The Displacement of Critical Responses in Spatial Stylus Mazes by Chimpanzees. S. D. S. SPRAGG, Yale University.

A series of experiments was carried out in an attempt to study in serial learning situations the conditions under which a distinctive act in a series of otherwise highly similar acts tends to be displaced in that series. These displacements may be referred to as anticipatory or as perseverative responses, depending upon the direction of displacement.

Spatial stylus mazes of the channel type were used. They provided the subject with the necessity of making a succession of choices between left-hand and right-hand pathways. Concealed stops in certain pathways determined the succession of correct choices. Subjects were immature chimpanzees of both sexes. Vision was permitted in some of the experiments; in others the animals were trained to work while blindfolded. Subjects were trained on various maze patterns with sequences of correct choices as follows: (1) the sequence rrrrrrrl, both with and without vision; (2) on a successively shortened pattern—rrrrrrl, rrrrrl, rrrrl, rrrl, rrl, and rl—without vision; (3) on the sequence rrrrlrrr; (4) on the sequence rrrrllll; and (5) on a channel type maze consisting of a long straight pathway with 7 short pathways leading off from it at right angles (all alleys

being blind alleys except the center one), both with and without vision.

In studying the kind and amount of displacement of the critical responses in the above experiments attention has been directed especially toward the following aspects of the data: (1) the initial appearance of anticipatory responses, and their history and subsequent fate with extended training; (2) the effect of the distance of the distinctive act from the terminal (goal) act on amount of displacement; and (3) the effect of the operation of various cues—visual, spatial, and perhaps summational—on such displacement.

The Influence of Amount of Incentive on Delayed Reaction Performance of Chimpanzees. H. W. NISSEN and J. H. ELDER, Yale University.

The effect of increasing and decreasing the amount of reward per trial on accuracy of response and on the limits of delay obtainable in the delayed reaction experiment was investigated with 4 young chimpanzees as subjects. The direct method of delayed reaction was employed. Banana was used as incentive.

Preliminary work shows that after an initial period of adjustment, during which accuracy of response increased gradually or suddenly, depending on the degree of the animal's "sophistication" in laboratory procedure, performance of delayed reaction as measured by accuracy and limits remains fairly uniform. The maximum delay obtained in 2 or more successive series, during which the delay interval was increased from day to day by small steps, was practically constant for each of the 4 animals, although differences from individual to individual were rather large. The number of trials given in succession had no appreciable effect on either of the 2 indices of performance used.

After the maximum delay had thus been determined for each animal, the amount of reward given on each trial was increased to from 2 to 5 times the original quantity. Without exception, this resulted in a sharp increase in the maximum delay obtained. The efficiency of the incentive, expressed as delay in seconds per gram of reward, was greater for the large than for the small incentives. When the amount of reward was again reduced, the efficiency of the incentive at first was greater than it had been originally, but with repeated series of trials tended to drop back to its initial value. This indication of a certain inertia or perseveration of the incentive effect is seen also in other aspects of the data to be presented.

Food-Sharing Behavior in Chimpanzees. M. P. CRAWFORD and H. W. NISSEN, Yale University.

An experimental situation is provided to permit controlled observation of food-sharing behavior in young (4 to 9 years) captive male and female chimpanzees. Two adjoining cages, separated from each other only by a grille of iron bars, are used. Accessible to one of these cages is an apparatus which delivers food when a token (poker chip) is inserted. One of a pair of animals is placed in each cage, or both animals are placed in the same cage. Food, tokens, or both are given to one member of the pair or are made accessible simultaneously to both chimpanzees. Twelve combinations of animals (8 individuals) have been observed in a total of 90 forty-five-minute experimental periods.

Special attention is given in this report to begging, giving, and competitive behavior and to the factors which stimulate or inhibit these activities.

The distribution of food and tokens is, without exception, more equal when both animals are in the same cage than when they are in adjoining cages. The more "dominant" animal does not always get the larger share of the food, even when the animals are together. Tokens are relinquished to another animal more readily than is the kind of food which those tokens will procure from the vending machine. Active solicitation or begging on the part of one animal may or may not stimulate the other animal to pass tokens or food; unsolicited passing or giving also occurs. Individual differences in the frequency of both types of behavior are marked; certain individuals never solicit food or tokens from another animal, although they may beg from the experimenter. Various other factors, such as the kind and amount of food used, degree of hunger and dominance relationships, influence the occurrence of begging, responsiveness to begging, and of competitive division.

CHILD AND DIFFERENTIAL PSYCHOLOGY

CHAIRMAN, LEONARD CARMICHAEL

Vocational Factors in Mental Organization. RUTH E. PERL and ALICE I. BRYAN, New York City.

Our problem is (1) to discover whether the pattern of mental organization differs in groups of students who select different vocational fields, (2) to discover whether specialized vocational training affects the pattern of mental organization in a group of students

undergoing such training, and (3) to discover whether these changes in pattern differ with different vocational training.

The professions chosen for comparison are teaching, commercial art, music, and nursing. The subjects consist of students equated as to sex (female), education (high school graduates), and age (within each main group), and divided into 2 main groups as follows: Group I, students in their first year of the following professional studies: teaching, art, and music; and Group II, students in these studies who have completed 2 or 3 years of training. The nursing school has not yet been selected. It is hoped that in 3 years the students who are now freshmen will be retested to discover the effects of professional training.

The tests administered were the American Council on Education Psychological Examination, the Bernreuter Personality Inventory, a test of motor speed, a test of memory for words, a test of memory for digits, and a test of memory for objects.

At present, means, sigmas, and reliabilities of differences will be reported. Correlational methods and factor analysis will later be applied to the scores of the entering and the trained groups within each vocational division, and comparisons will be made among the various groups. It is hoped that this study, when completed, will answer 2 questions: (1) are different patterns of mental organization in students related to interest in and success in preparing for different vocations; and (2) what is the effect of specialized training on mental organization.

A Preliminary Report of Experiments with West African Negroes. H. S. Oberly, University of Pennsylvania.

In the summer of 1934 experiments were conducted in the hinterland of the Republic of Liberia, West Coast Africa. A sampling of the native population was secured by a 500 mile trip into the hinterland going as far as the border of French Guinea. No experiments were conducted nearer the coast than a three-day journey. Subjects were obtained in 16 different towns on 21 days of experimenting. More than 20 different tribes were represented, though the majority of subjects were from 3 tribal areas, the Beli, the Loma or Buzi, and the Kpele or Pessi. A total of 550 subjects were used, 407 males and 143 females. The age groups were small boy, small girl, boy, girl, man, woman, old man, and old woman. Several standard psychological tests were tried and discarded in favor of a block tapping experiment and an apprehension span experiment, using a

portable tachistoscope and cards with black dots. Verbal instructions and verbal reports were not used at any time in the course of the experiment. The results presented in this report indicate a definite sex difference as well as an age group difference in abilities.

"Confusion" as an Aspect of the Learning of Older Adults. IRVING LORGE, Teachers College, Columbia University.

A population of 110 subjects made available through the Works Division, Department of Public Welfare, City of New York, participated, among other tasks, in a series of routine laboratory learning exercises. Of this group 25 persons between the ages of 20 to 25 were equated on the basis of the I. E. R. Intelligence Scale C. A. V. D. (reliability=.999) to 25 persons over the age 40.

The materials were a revision of the code substitution experiment, of the mirror reading experiment, and of a new material which was essentially code substitution printed under mirror reading conditions. The schedule required 20 pages of a minute each of the code and of the mirror reading for 8 days. At the expiration of this part of the experiment an interval of a week elapsed before the combination material was presented for 3 days of 12 successive pages of a minute each.

The curves for the young and old were derived and show the characteristic differences. The combination material, however, shows that the old group does not improve on the combination material until the second day, whereas the young group improves from the start of the combination experiment.

Measuring Scope in the Use of and the Belief in Words by Adults. JACK SANDERS, Columbia University. (Introduced by H. L. Hollingworth.)

A test in the use of words, and 2 tests of credulity were given to 177 adults. The use of words test required the subject to select certain words to direct a chance acquaintance to a picture in a large museum. The credulity tests required the subject to rate 30 popular superstitions and 30 artificial propositions (made by chance) for belief. These results were correlated with scores on perceptual, memory, intelligence, and bias tests. Individual cases were then eliminated to discover cause and effect relationships; *i.e.*, various outstanding examples were interviewed and their behavior discussed with friends to determine whether 'great bias' really is the cause of their lack of scope.

Some general implications of using the term "scope" will also be discussed.

The Structure of Reading Ability. ARTHUR I. GATES, Teachers College, Columbia University, and JOSEPH ZUBIN, College of the City of New York.

The intercorrelations between 27 tests involved in reading ability were examined by the Hotelling method of Principle Components to determine the minimum number of independent factors that must be postulated to explain the table of intercorrelations. It was found that only 3 factors are needed to explain the entire table. These factors were identified by their intercorrelations with the individual tests, and were found to correspond to: (1) a general intellectual factor, (2) a visual factor, and (3) a memory factor. The method of factor analysis has 2 important limitations: (1) It can be applied only to data that are related linearly; (2) it factorizes the ability into theoretical factors that are not easy to identify. In order to be of use in remedial work, the population should be factorized and not the tests. In order to accomplish this, pattern analysis instead of factor analysis must be resorted to. A new method for pattern analysis will be suggested.

Empirical Approaches to Personality Gestalten. BARBARA S. BURKS, Teachers College, Columbia University.

Most of the experimental studies in the personality field have attempted either (1) to abstract the person by fragmenting him into "traits" (introversion, ascendence, honesty, etc.), or (2) to study "personality" quite independently of the "person". The man in the street probably, and the novelist and dramatist almost surely, have a sounder conception of how the wheels go round than most experimental psychologists. Mark May has said that we now need research to illuminate those vital lay concepts, "He would", "Can he take it?", and "How did he get that way?" To these the writer would add, "He could", conceived both altitudinally as the behavior of which the person is capable under tremendous motive, and horizontally as the *range* of behavior which the person's make-up allows in a given situation; also, "What's wrong with this picture?", referring to the person's inner evaluation that precedes and regulates some of his adaptive behavior.

Illustrations of studies oriented toward such questions as these are found in the recent (unpublished) work of the writer on *predic-*

tion of behavior in preschool children, on an item-rating analysis based upon an adjustment inventory, and on a study of personality constellations in identical twin girls reared apart.

A Nine-Year-Old Microcephalic Without Mental Deficiency. WILBERT S. RAY, State Hospital, Trenton, New Jersey.

There is reported a case of a nine-year-old boy who is small for his age, has a mental level of inferior normal, and a cranial circumference of 43.0 cm. The head size falls near the upper limit of microcephalic heads. He is microcephalic but not mentally defective.

PHYSIOLOGICAL PSYCHOLOGY

CHAIRMAN, C. L. HULL

Salivary Conditioning in Adult Human Subjects. G. H. S. RAZRAN, Columbia University.

Thirty different modes of salivary conditioning were studied in 30 adult human subjects. The saliva was measured by an absorbent technique. About 15,000 trials were made. The conditioning stimuli were eating pretzels, observing the eating of pretzels, thinking of eating pretzels, thinking of eating steak, and keeping mints on the tongue. The conditioned stimuli were the sound of a metronome, nonsense syllables and words projected on a screen, and thinking of nonsense syllables. Instructions for the nonsense syllables were to connect them consciously with saliva, not to so connect them, that they mean saliva in some African language, and no special instructions. The number of subjects in the experimental room varied from 1 to 4, while the combinations of the conditioned and conditioning stimuli in one session varied from 3 to 20.

Results show: (1) The efficacy of conditioning bore little relationship to the amount of training, or to the number of the combinations of the conditioned and conditioning stimuli per session. (2) When conditioning occurred there were few signs of extinction. (3) Verbal instructions had the greatest efficacy. (4) Without instructions, a metronome was a more effective conditioned stimulus than a word or a nonsense syllable. (5) Words were less effective and less regular conditioned stimuli than nonsense syllables. (6) Conditioning was affected by social factors, there being more conditioning with 3 than with 2, and with 2 than with 1 subject, but there were no differences between 3 and 4 subjects in the room. The results gave as a rule U shaped curves, indicating that the subjects

were under the influence of a dichotomous tendency toward the conditioning.

The general conclusion is that conditionings of consciously controllable responses do not normally yield results comparable to those of lower animals or of unconscious responses, and require additional hypotheses for their complete explanation.

The Rôle of "Effect" in Conditioned Leg Withdrawal. HAROLD SCHLOSBERG and WILLIAM E. KAPPAUF, Brown University.

If the "law of effect" holds for conditioned withdrawal responses, one might expect that situations in which the animal prevented or terminated the shock by its response would result in better conditioning than would those in which the duration of the shock was predetermined by the experimenter. That this does not seem to be true for the conditioned tail withdrawal in the rat has already been reported by one of the authors.

To eliminate the possibility that these results were peculiar to the tail, comparable studies were carried out with the fore leg. The only change in the apparatus was a new holder. Five rats were stimulated by a buzz or light presented alone for 335 σ, continued with a shock to the leg for an additional 165 σ. Paired off with each of these rats was another, trained under strictly comparable conditions, except that beginning of the leg movement short-circuited the electrodes. Regardless of the criterion of conditioning used, the "short-circuit" animals were, if anything, inferior to the others. Parenthetically, it was noted that the leg flexion does not condition as readily as the tail withdrawal.

To make certain that these results were not peculiar to the time interval used, the junior author experimented with 16 rats, using 5 different durations of buzz, varying from ⅓ to 7 sec. Again comparing the animals by pairs and allowing for individual variations, little clear-cut difference between results of the 2 methods was found. Other variations in the technique are planned in the hope of throwing further light on the rôle of "effect" in conditioning.

Experiments Comparing the Effects of Removal of Reward from a Learned Maze with the Phenomena of Experimental Extinction. NEAL E. MILLER, Yale University.

The effect of non-reward upon the disintegration of habits has been relatively neglected by psychologists.

The apparent functional similarity between a succession of non-

rewarded runs in a learned maze and a succession of non-reinforced presentations of a conditioned stimulus was the point of departure for the present studies. Forty albino rats were employed. An attempt was made to determine whether or not the principles discovered by Pavlov in the non-reinforced conditioning situation were general enough to be applicable to the non-rewarded maze situation. An attempt was also made to discover additional principles of behavior that might manifest themselves when the reward was removed from a simple maze.

Four of the major phenomena described by Pavlov as being associated with the non-reinforced repetitions of a conditioned response were found characteristic of the behavior resulting from non-rewarded trials in an overlearned maze: (1) A succession of non-reinforced trials produced a decided decrement in the learned response. This manifested itself as a decrease in speed and an increase in errors. (2) A short interval of time resulted in an almost complete recovery in terms of both of these aspects of this decrement. (3) Caffeine was found to minimize the effects of non-reinforced trials. (4) The effects of non-reinforcement could become conditioned in a relatively permanent fashion to definite stimuli.

Additional phenomena, not described by Pavlov, were: (1) A qualitative shift in the distribution of errors. This seemed to be a regression to an earlier distribution of errors. (Such a regression would be in line with Freudian principles.) (2) A syndrome of agitated behavior.

Restitution of Function After Cortical Lesions in Monkeys. C. F. JACOBSEN and GEORGE M. HASLERUD, Yale University.

Evidence from clinical and experimental studies indicates that the effects of cortical injuries are less severe in infants than in adults. When the cortical components of the postural and locomotor mechanisms are destroyed in adults, the animals lapse into an enduring paralysis of voluntary movement. When these areas are removed from the hemispheres of an infant monkey, the paralysis is transient, and the animal is soon able to run, climb, and manipulate objects. It seems probable that recovery of function in the young animal involves reorganization of a system of which only a part, the cortical component, was destroyed, and that the recovered functions are mediated through intact lower levels of the nervous system.

These experiments are concerned with restitution of function for a type of behavioral integration, delayed response, which in the adult

animal is dependent upon the intactness of the frontal association areas, and which has no known alternative cortical or subcortical mechanism. Two infant monkeys were the subjects. In one the frontal association areas were removed from both hemispheres; in the other, the motor and premotor areas. The 2 infants were returned to their mothers with whom they remained until normal weaning. Training on delayed reaction was undertaken when the animals were 10 and 14 months respectively. The subject from which the motor and premotor areas had been removed passed the delayed response tests with delays of 15 sec.; the other failed at 2 sec. These results are consistent with findings on adult animals. It thus appears that although there is considerable recovery of motor function when the injury occurs early in life, there is not a comparable restitution for integrations more strictly dependent upon the cortex.

The Reflex Character of First Fetal Movements. CHARLES S. BRIDGMAN and LEONARD CARMICHAEL, Brown University.

Some students of the development of behavior in mammals hold that specificity of response always develops out of a matrix of earlier mass activity. Other recent students hold that the first movements, at least of certain fetal mammals, are discrete reflexes.

The present paper records results of an investigation of the onset of behavior in the fetal guinea-pig. All the previous students (Preyer, Yanase, Carmichael) report 28 days as the onset of motility in this organism. This study indicates that, under favorable conditions, behavior begins on the twenty-seventh day. Sixty-one living fetuses of known copulation age between 646 and 712 hours from 21 maternal organisms have been studied during the present season. The technique employed was such as to keep the fetal material under relatively normal conditions and with maintained maternal blood supply.

A study of the protocols so far taken and of the motion picture records of the same material shows that the first movements are what appear to be definite, independent flexions of the fore limbs and slight independent contraction of neck muscles which lead to head movements of small amplitude. These first movements are either "spontaneous" or result from what is presumably proprioceptive stimulation which is brought about by experimentally moving limb or head by appropriate external means.

This study is thus tentatively taken to support a correctly understood reflex rather than an organismic theory of the onset of behavior.

Action Currents from the Occipital Region of the Brain in Man as Affected by Variables of Attention and External Stimulation. H. H. JASPER, RUTH M. CRUIKSHANK, and HELEN HOWARD, Bradley Home and Brown University.

Electrodes applied on the surface of the head over the occipital region in man pick up fairly regular rhythmic oscillations of potential at a frequency of about 10 cycles per sec. These brain potentials appear at their maximum amplitude and regularity when the subject is completely relaxed with the eyes closed. The oscillations may be made to disappear completely with light or sound stimulation under certain conditions of attention. Records from 20 subjects were obtained with the brain potentials from the occipital region, together with the incidence of light and sound stimulation and a signal to indicate the voluntary finger movement reaction to external stimulation, to after-images, to changes in attention, etc. The finger reaction alone had no effect on the potentials from the occipital region of the head. The reaction time for this response of the occipital cortex to light stimulation is from .20 to .40 sec. with some interesting variations of this general tendency. Visual after-images affect these oscillations in the same manner as a positive light stimulation, but to a lesser degree. Psychological conditions of attention also have been shown to cause their diminution. A discussion of the various conditions affecting the size and regularity of these brain potentials will be given together with a discussion of some possible applications of the technique of electro-encephalography to various psychological problems.

Sensory Discharges in Cutaneous Nerve Fibers Following Chemical Stimulation. CARL PFAFFMANN and H. H. JASPER, Brown University.

After application of chemical stimuli to the skin of the frog, the electrical response of the related dorsal cutaneous nerve was recorded by means of an amplifier and oscillograph system. The method by which stimulus solutions were applied permitted control of the area and the intensity of stimulation. Tactual stimuli alone were also used in a series of control experiments.

In general, tactual stimulation was accompanied by the so-called A-type impulse, chemical stimulation by the B- and C-type impulse. Following application of sodium chloride solutions of varying concentrations, the frequency of discharge in the whole nerve, after a long latent period, rose to a maximum and then fell off. The increase in frequency is a sigmoid function of time, the decrease a linear func-

tion. In the present experiments the maximum frequency was reached in approximately 1 to 2½ min., depending on the concentration of the stimulating solutions. As the concentration of the solution was increased the maximum frequency increased and the latent time decreased. The discharge in what was presumably a single fiber is typical of the form which has been shown to be characteristic of that correlated with a slowly adapting receptor.

The nature and magnitude of the variation in nerve response, with changes in concentration of the stimulating solution, substantiate the view that the major part of the frog's reaction time to chemical stimuli, as illustrated by the reflex withdrawal of the foot when immersed in salt solutions, is consumed in the receptor process.

The Corneo-Retinal Potential Difference as the Basis of the Galvanometric Method of Recording Eye Movements. O. H. MOWRER, T. C. RUCH, and N. E. MILLER, Yale University.

Leon I. Meyers and Edmund Jacobson have noted that if electrodes were placed on the temples or above and below only one eye and were connected to a sensitive string galvanometer, movement of the eyes toward one electrode caused the string to move in one direction and movement of the eyes toward the other electrode caused the string to move oppositely. These writers have assumed that the phenomenon was due to the summation of action currents from the extrinsic eye muscles. This hypothesis seems untenable to us. We have tested various pairs of antagonistic skeletal muscles, but in no case has any condition of relative relaxation and contraction of the opposing muscles been characterized by a reliable difference. With the eyes, there is a positive potential on the electrode toward which the eyes are turned, *i.e.*, in the area of the more contracted extrinsic muscles. Still more convincing evidence against the muscular action-current theory is the fact that entirely typical galvanometric records are obtained when the eye is moved passively (anaesthetic cat). By using a direct-current vacuum-tube amplifier, with no extra-somatic current impressed upon the subject, we have shown that the phenomenon is not due to resistance changes nor to polarization of electrodes but is rather the result of a true potential difference between the areas under the electrodes. After a variety of experiments, it was concluded that the galvanometric effects occurring with change in eye position could be accounted for only by assuming the existence of a stable potential difference between the cornea and the retina, the latter being negative with respect to the former. Direct examination of both excised eyes and eyes with the optic nerve and muscles

exposed but still intact reveals that our inference is correct. That the galvanometric method of recording eye movements is based upon this corneo-retinal potential difference and has nothing to do with action currents arising from the eye muscles is further confirmed by observations made upon subjects with experimentally degenerated retinas.

Changes in the Functional Capacity of the Conduction System. M. N. CHAPPELL and F. H. PIKE, Columbia University.

Changes in the functional capacity of the conduction system are indicated by a multitude of names, which may be reduced to 3: growth, compensation for injury, and learning. A multitude of names, or even 3, may not necessitate more than a single underlying physiological process.

This paper aims to show that there is a high degree of probability that the change which underlies the acquisition of new forms of behavior is in all cases the same; and further, that the nature of this change in the nervous structure is one of increase in size, both with respect to the size of the nerve cell and cross-section of the axone.

Evidence strongly indicating such a conclusion is drawn from the following sources:

1. Observations on the structural changes in muscle tissue under conditions similar to those of learning and forgetting.

2. Observations by Luciani, Mott, Yates, Langley, Pike, and Chappell on recovery of functions following experimental lesions of the nervous system.

3. Observations by Warrington and Cajal on the histological changes in nerve cells after experimental lesions.

4. Observations by Donaldson and Nagasaki on the increase in size of nerve fibers and nerve cells toward the close of the period of growth.

5. Observations by Rawitz and Langley on the failure of development of secondary and tertiary afferent neurones in young animals, after injury to the primary neurones.

EXPERIMENTAL PSYCHOLOGY

CHAIRMAN, S. W. FERNBERGER

The Loudness of Complex Sounds. D. EVERETT BAIER, Princeton University. (Introduced by C. W. Bray.)

The experiment studies the variation in loudness of complex sounds resulting from changes in the intensities and frequencies of

the components. A complex sound was alternated with a pure tone and the subject adjusted the intensity of the latter until it appeared of loudness equal to the complex. Thus, the loudness of the complex sounds was obtained in terms of a single frequency. The complex sounds were composed of 1,600 and 1,400, 1,600 and 2,000, 1,600 and 4,000 cycles per sec.; each frequency combination was presented in 16 different intensity combinations. The comparison frequency was 1,600 cycles. Each of 3 subjects made 10 comparison judgments with each of the 48 complex sounds.

The observed results are compared with theoretical values calculated on the basis of Fletcher and Munson's equations for the loudness of complex sounds. Various theoretical implications are considered.

The Effect of Continuous Auditory Stimulation on the Residual Hearing of Deaf-Mutes. Louis Wm. Max, New York University.

The inconsistencies in the findings on stimulation-deafness in animals and the recent claims of a deafness cure based on continued stimulation prompted the present study of the effect of prolonged exposure to loud tones upon the hearing of human subjects. The subject was a sixty-three-year-old deaf-mute who perceived bone-conducted sound below 256 cps. With an oscillator, amplifier, and bone-conduction receiver, his auditory limens for both ears for tones of 255, 60, and 45 cps were determined each week-day morning and afternoon, before and after a two-hour stimulation period. The stimulation consisted of a loud 255 cycle tone applied by the bone-conductor to the left mastoid process only, for a total of 39 days from November 30, 1934, to April 1, 1935.

In spite of slight recoveries during some of the rest periods, our preliminary results show a net audibility loss of 40 decibels, not only at 255 cycles, the stimulation frequency, but also at 60 and 45 cycles, and not only for the stimulated but also for the "unstimulated" ear. Possible explanations of this loss are discussed and attention drawn to the differences between bone-conducted and air-conducted stimulation.

The Extent of the Intensity Irradiation of Visually and Tactually Conditioned Responses. Carl Iver Hovland, Yale University.

In one group of 20 subjects galvanic skin reactions were conditioned to a light stimulus. In another group of the same size con-

ditioned galvanic responses were established to a cutaneous vibratory stimulus. In both cases the unconditioned stimulus used was an electric shock from a Cambridge inductorium. The stimuli were delivered with precision by means of a heavy compound pendulum. The galvanic responses, together with the time of presentation of stimuli, were recorded on a stylographic-paper polygraph.

Half of the first group was conditioned to a light stimulus of weak intensity; the other half, equated on the basis of the strength of their unconditioned reactions to shock stimuli, was conditioned to a light of strong intensity. Likewise the group given the vibratory stimuli was divided into equivalent sub-groups, one half being conditioned to a weak intensity of the vibrator, the other half to a strong intensity. Following the period of reinforcement, reactions were obtained to the strength of stimulus used in conditioning, and, in addition, to the strength of stimulus used in the control sub-group. Weak and strong stimuli were presented in pre-arranged balanced order. Ratios, expressing the relationship between the magnitude of response to the stimulus strength used in conditioning and that in response to the intensity not used, were obtained at successive stages of testing. Profound generalization of response is indicated at first. During the testing procedure the conditioned responses extinguished very slowly, while the irradiated responses extinguished quite rapidly. Differentiation increased gradually, even though the traditional contrast method of Pavlov for producing differentiation was not employed.

The Effect of Previous Experience and Suggestion on the Perception of Apparent Movement. E. LOWELL KELLY, Connecticut State College.

This experiment was conducted for the purpose of determining to what extent the perception of apparent movement is influenced by previous experiences and by verbal suggestion. A modification of the Kelly-Miles unit for demonstrating patterns of apparent movement was used. The visual stimuli consisted of various combinations of flashlight bulbs which were flashed alternately on and off by a motor driven commutator at intervals of approximately 60 sigma. Roughly 400 elementary psychology students served as subjects in a series of 3 group experiments. None had seen previous demonstrations of the phi phenomenon. Approximately one-half of the subjects reported seeing simple movement (2 lights flashing alternately) without any suggestion. Immediately after being told what to look for, seen

movement was reported by 94% of the group. With the simple movement in the horizontal plane, 30% report it as describing an arc as compared with only 5% who report other than a straight line for vertical movement. Twice as many report the arc curved downward as report it curved upward; of the 48% reporting a difference in the upward and downward speed of the vertical movement, 32% report a more rapid falling motion, and 16% a more rapid rising motion. When shown a pattern movement with 2 possible interpretations, the first perceptual experience of 95% of a naïve group was determined by suggesting the movement which would be seen, although practically all saw both patterns later. The stimuli patterns used will be demonstrated and a number of theoretical implications of the results will be discussed.

A New Rotating Chair for Vestibular Stimulation. J. Q. HOLSOPPLE, New Jersey Department Institutions and Agencies, and Princeton University.

The rotating chair herein described was devised to provide a uniform acceleration throughout the period of acceleration and at a rate which can be controlled by the experimenter. Preliminary data are presented which show the utility of the device.

Previous chairs have been driven by hand, by an electric motor, or by air propeller. There is no convenient way in which the acceleration rate can be maintained at a constant value with any of these devices. The chair reported is mounted on ball bearings. A drum is attached to the shaft and a fixed cable attached to the drum. The cable is laid over pulleys so that a weight suspended on the free end of the cable exerts a force tangential to the axis of rotation. These conditions are such as to insure theoretically a perfectly uniform acceleration rate. Slight variations in the leveling of the chair produce variations in acceleration rate of the order of a fraction of a degree per second. Calibrations of the chair in actual use show at high acceleration rates negligible variations but at 2 degrees per second variations of about ½ degree per sec. may be expected. Preliminary data indicate that the responses of past-pointing and nystagmus do not occur immediately upon the onset of stimulation but with even relatively high rates lag behind. It is probable that studies of vestibular response should be made in terms of the immediate normal reactions to the stimulus rather than in terms of these delayed responses to an unusually prolonged stimulus.

The Influence of Incentive on the Performance of Mental Work. GEORGE H. ROUNDS, Columbia University.

Place an incentive (money reward) before a man who is doing hard problems in addition. Measure his performance in terms of problems done per unit of time and the metabolic cost per problem. The work period is 20 min. Interest in this incentive rises and falls from day to day and in different parts of the single day's work. The essential question is this: does this incentive elicit an inner response? There is evidence that sometimes the subject increases his score at a greatly reduced cost per problem. This points to an inner response which makes the performance more efficient. How can the subject secure this inner response? Is the response accidental? Is it subject to voluntary control?

The Judgment of Manual Expressions. NILS Y. WESSELL, Brown University. (Introduced by L. Carmichael.)

Roberts and Carmichael reported that the ability of intelligent adults to give common verbal names to still pictures of isolated posed hand gestures was fully comparable to the reported capacity of similar groups to give common names to various facial expressions.

In the present study the same experienced actor who posed for the still pictures mentioned above acted out a series of dynamic manual expressions which were recorded in moving pictures. Thirty-five sequences were selected. By means of prints taken from the master film a final film was assembled which gave the following order of succession: Title: "No. 1"—Picture of dynamic gesture No. 1—Blank film—Picture of gesture No. 1 again—Blank film—Picture of gesture No. 1 again—Blank film; Title: "No. 2", and so on. A pause was made between each triplicate presentation of the dynamic gesture so that the subjects could record their judgments.

Data were obtained from college students who viewed the dynamic gestures projected on a screen. The judgments were not controlled by word lists. One hundred eighty-two men and 104 women acted as subjects. The dynamic gestures giving the highest commonality of response were judged as follows: (1) pleading, (2) prayer, (3) fear, (4) scolding, (5) determination, (6) repulsion, (7) supplication, (8) satisfaction, (9) nervousness, (10) anxiety.

In comparing the present study with the study using still pictures previously reported, it may be said tentatively that dynamic manual expressions as presented in moving pictures are judged with greater commonality of verbal response than are projected still pic-

tures. Other incidental results of this study and its significance for general theories of emotion are pointed out.

The Atmosphere Hypothesis in Syllogistic Reasoning. SAUL B. SELLS, Columbia University.

In examining the detailed reports of Störring and Wilkins of experiments with syllogistic forms, Woodworth was impressed with the frequency with which the false converse of a simple proposition was accepted as correct, even by educated subjects. He found that when the subject does not *see* the relationship clearly, he carries over the feeling or suggestion of the premise into the conclusion, and therefore he readily accepts the simple converse of any symbolic proposition. Such is the "atmosphere hypothesis". Using the customary symbols, A, E, I, and O, for the 4 kinds of propositions, the atmosphere effect of these propositions is: A—universal affirmative (All A is B) has an "all-yes" atmosphere; E—universal negative (No A is B) has an "all-no" atmosphere; I—particular affirmative (Some A is B) has a "some-yes" atmosphere; O—particular negative (Some A is not B) has a "some-no" atmosphere.

This paper presents the atmosphere hypothesis, supplemented and developed to cover the syllogism. The data of 2 studies were analyzed and are presented in support of the hypothesis. Acknowledgment is made to Professor Woodworth for devising the analysis and for his invaluable aid.

Creative Thought in Poets. CATHERINE PATRICK, Columbia University. (Introduced by R. S. Woodworth.)

Creative thought was studied in a group of 55 poets and a control group of 58 persons who had not written poetry. The groups were equated on the basis of the vocabulary of the Thorndike CAVD Intelligence Test. The interview consisted of a preliminary period of conversation, until the subject was talking freely. He was then presented with a picture of a landscape, and was asked to write a poem about it. He was told to talk aloud constantly all the time that he was thinking of it, while the experimenter recorded in short-hand everything that he said, and noted the time. The subject was also given a questionnaire on general methods of work.

The poems were fairly representative of the usual work of the poets. Each report was divided into quarters on the basis of the total time consumed. The percentages of instances of thought

changes, of the first formulation of lines, and of revision were calculated for each quarter separately. This supports Poincare's hypothesis that there are 4 stages of creative thought, namely, preparation, incubation, illumination, and revision. The average length of the poems and the speed of writing was about the same for the 2 groups, but the quality of the poets' work was better. The poets have a wider and more varied imagination than the control subjects, and are more influenced by the modern conventions of writing poetry. As a rule, a short lyric is incubated a while and is then composed all at one time in a more or less emotional state, and part of the lines come spontaneously. The content is thought of before the form, and the essential structure remains unchanged in revision.

Progress in the Development of a New Medium for Psychological Instruction and Experimentation. CLYDE W. GLEASON, State Guidance Services, Hartford, Connecticut.

Batteries of instructional film slides, extended since reporting at the last meeting, were shown. Advantages of the method are:

(1) A wide range of demonstrations, tests, and experiments is covered with 2 items of equipment: a projector and a screen. (2) This medium is clear and vivid. Student interest is marked and persistent. (3) No mechanical skill is needed. (4) It does not reduce the instructor to the rôle of mechanician or observer. (5) A "psychograph" for each individual student may be built. (6) It is an effective partial substitute for the psychology laboratory for small institutions which cannot maintain equipment. (7) It fits practically any course organization or textbook.

(8) It is peculiarly adapted to psychology: (a) Serial presentations can be simply and easily administered and controlled, can be of any length, and can be run either forward or in reverse. Any type of visual stimulus can be employed. (b) Colors can be shown clearly and vividly. (c) Tachistoscopic presentation, through shutter-action across the light-beam, is accurate and simple, and applicable to large groups. (d) Time control is accurate and simple. (e) The simultaneous presentation of two or more visual items in the same field is easily effected; synchronization with sound or other stimuli may be accomplished by simple hand controls. (f) Portions of stimulus patterns may be temporarily shielded. (g) Presentations are entirely free from noise. (h) Instructions, warnings, reminders, etc., may be inserted at any point.

Social and Abnormal Psychology

Chairman, Clairette P. Armstrong

Personality Factors in Juvenile Delinquency. J. B. Maller, Teachers College, Columbia University.

This is a report of a study of the social, cultural, and emotional background of serious problem cases, truants and delinquents. The study is based on the records of the Children's Court and the Probation Schools of New York City.

Spot maps were prepared showing the number of cases coming from each neighborhood of the city, and the rate per 1,000 children of court age. An analysis was made of the relationship between the rate of delinquency and various aspects of the social, economic, and cultural characteristics of the neighborhoods.

Complete case studies were made of 400 pupils enrolled in the Probation Schools. Each case record included an individual conference and interview with the child, the complete school history, and a home visit. Intelligence and personality tests were given to a large number of cases. The problem cases were compared with a normal group equated per age and school status. An item analysis was made of the personality test results of the normal and problem groups.

The study has yielded several recommendations for improvement in the psychological diagnosis and treatment of cases of serious social maladjustment.

Sensory Acuity in Psychopathic Individuals. Marion R. Bartlett, New Haven, Connecticut.

The auditory acuity of a group of 24 psychoneurotics and of 26 dementia praecox patients at the New York State Psychiatric Institute and Hospital was compared with that of a control group.

From earlier descriptive work of the symptoms of psychoneurosis as well as from casual observation of neurotics, it has been thought that they surpassed normal individuals in sensory acuity. The auditory threshold was ascertained by the method of limits with an audio-oscillator as the stimulus. The threshold obtained was measured in decibels. A comparison of the normal and the psychoneurotic group showed that the average threshold was almost identical for the 2 categories. Sensory acuity as measured by audition shows it to be no different in neurotics than in normals. This fact was further borne out when we averaged the lowest reading (of a series of 20) for each subject, for the 2 groups. It would appear that increased

distractibility of attention rather than increased acuity was responsible for the seeming sensitivity of neurotic subjects.

When the dementia praecox group was compared with the normal we also found that the average auditory threshold was practically the same for these 2 groups. This gives experimental confirmation of Kraepelin's statement: "Perception of external impressions in dementia praecox is not usually lessened to any great extent, as far as superficial examinations go." It would appear that the dullness and apathy toward the environment, characteristic of this syndrome, are entirely due to other factors than sensory deterioration.

A Study of the Process of the Development of Attitudes Toward Negroes. EUGENE L. HOROWITZ, Columbia University.

This is an investigation of the attitude of whites toward Negroes. To get a genetic picture, a sampling of boys, from kindergarten through the eighth grade, was used. Three tests, based on 2 types of photographic materials, were suitable for administration as a group test to the older boys.

The 3 tests gave differently shaped curves. On Test A, which required the children to rank Negro and white faces in the order liked, considerable prejudice was displayed for the age range. There was no reliable trend. Test B, involving selection of companions for imagined situations from the group of Negro and white faces, yielded a negatively accelerated growth curve. The curve obtained from Test C, where the response was an all-or-none rejection of participation in a pictured situation, showed little prejudice, but rose steadily. Several analyses of the data were undertaken, confirming the view that the tests tapped significantly different modes of response. Regression lines fitted to the z-function equivalents of the coefficients of correlation between the tests showed a reliable increase in the intercorrelations between Tests A and B, and between B and C, but between A and C, the increase was unreliable.

Though 3 different types of prejudice systems increasing with age seem to be present, another interpretation is offered. The tests represent performances involving different thresholds for the display of prejudice; thus, one may like a Negro less than a white child, but still like him enough to include him in a projected ball game; one may be unwilling to include a Negro in a ball game, but still be willing to join a game in which a Negro is participating. This suggests that the development of prejudice against Negroes consists in the constant diminution of the attractiveness of Negro children, first to the

point where whites are preferred, later where Negroes are not included, to the point where the attraction is negative repulsion.

Expressed Willingness to Take a Chance. DANIEL HARRIS and W. W. TWITCHELL, Lehigh University.

Subjects were presented with hypothetical situations. In each, they had decided to commit a certain crime, and were to choose 1 out of 5 states in which to do so. Certainty and severity of punishment in the 5 states vary from 99% certainty and a three-month sentence in state A to 1% certainty and a life sentence in state E. The crimes involved vary from trifling to very serious, each tapping a different 'motive'. On the assumption that choosing state E expresses a 'take-a-chance' attitude, results on a heterogeneous sampling were analyzed for age, marital, occupational, and racial differences. There are some suggestive findings. Earlier findings of Hollingworth as to general distribution of answers are confirmed.

The Attitude of a Group of Relief Workers Toward Work Relief. SIDNEY ROSLOW, New York University.

The problem is an investigation of the attitudes and feelings of a group of relief workers toward the question of home relief *vs.* work relief. The relief workers were a group of 98 men and women employed by the Emergency Relief Bureau, Works Division, on research projects at New York University, University Heights. The procedure was a direct interview technique in which a questionnaire and an attitude scale toward methods of relief were used. The workers interviewed had been informed, prior to the making of the interview, that this study would be made, that it would be anonymous as far as they were concerned, that no attempt at identification would be made, and that it would have no repercussions. The interviewers were a staff of fellow relief workers. The interviews were made January 31, February 1, 4, and 5, 1935.

The results indicate that all the workers prefer work relief to home relief. There is a strong dislike for home relief. The group as a whole is well satisfied with the work relief set-up. The principal objection with work relief refers to the question of salary. Most relief workers believe that they should work as hard on their relief jobs as they would on regular jobs. However, 40.8% admit that most of them actually do not. The outlook for economic recovery is inclined toward pessimism rather than optimism with respect to the length of time the depression will continue.

A Study of the Attitude of 800 Citizens of New York City Toward the Payment of the Bonus. RENSIS LIKERT, New York University.

With the aid of Sidney Roslow, O. C. Frey, O. H. Hiester, and 80 undergraduate students of New York University, 895 citizens of New York were interviewed concerning their attitude toward the payment of the bonus. The data obtained were analyzed to determine not only their attitude toward the bonus but to throw light on the factors which were responsible for their attitude.

The more important and significant results of this study will be presented. Thus, for example, of the 575 men interviewed 45.8% favor immediate payment, 50.8% are opposed, and the rest are undecided. Among the women, 48.5% favor immediate payment and 40.1% are opposed, with the rest being undecided. The higher economic groups are opposed to immediate payment, while the lower economic groups favor immediate payment.

Political Attitudes and Party Regularity. S. P. HAYES, JR., Mt. Holyoke College.

The attitudes of 8,419 voters in 35 states toward 2 statements concerning each of 12 important issues of the 1932 presidential campaign were examined to discover which attitudes were associated with party "regularity" and which with changing in 1932 from the 1928 party. The effects of occupational and sex sampling errors were controlled.

Approval of tariff reduction and of bonus payment were both very important factors in Democratic (as compared with Republican) adherence in 1932, regardless of 1928 affiliation. Advocacy of repeal and of direct federal relief were significant only in the case of those who were not Democrats in 1928.

Within each 1928 group of voters, the attitudes significantly associated with joining the Socialists in 1932 were advocacy of government ownership, recognition of Russia, reduction of tariffs and armaments, cancellation of war debts, heavy taxation of the rich, adherence to the World Court, and a liberal monetary policy.

Among the women of all groups there was less correlation than among the men between attitudes and intended vote in 1932.

In general, those voters who changed parties retained certain of the attitudes associated with their former parties, taking on only a portion of those of the new one. Consequently, the new members within each party decreased the homogeneity of the party as a whole.

PROCEEDINGS OF THE TENTH ANNUAL MEETING OF THE MIDWESTERN PSYCHOLOGICAL ASSOCIATION

ARTHUR G. BILLS, SECRETARY, UNIVERSITY OF CHICAGO

The Tenth Annual Meeting of the Midwestern Psychological Association was held May 10 and 11, 1935, at the University of Kansas, under the Presidency of Professor John A. McGeoch of the University of Missouri. The chairman of the local committee was Professor R. H. Wheeler. About 225 persons attended.

At the annual business meeting, it was voted to continue the publication of an annual yearbook, and to clarify further the requirements for membership by requiring either membership in the American Psychological Association, or some recognized regional psychological association, or the recommendation of some member of the Midwestern Psychological Association, and the approval of the Council. It was voted to hold the 1936 meeting at Northwestern University, Evanston, Illinois. The following newly elected officers of the Association were announced:

President, 1935–1936, Christian A. Ruckmick, Iowa State University.

Council Member, 1935–1938, F. C. Dockeray, Ohio State University.

PROGRAM

FRIDAY, MAY 10, 9:30 A.M.

SECTION A

E. A. CULLER, University of Illinois, *Chairman*

1. *Stimulus, Sensation and Meaning.* G. D. HIGGINSON, University of Illinois.
2. *The Neural Correlate of the Affective Process.* CHRISTIAN A. RUCKMICK, Iowa State University.
3. *The Relation of Eye-Movements to Varieties of Clearness.* ROY B. HACKMAN, University of Nebraska.
4. *Visual Factors Involved in Depth Perception.* EARL ALLGAIER, Iowa State College.

SECTION B

JOHN J. B. MORGAN, Northwestern University, *Chairman*

1. *Results of the Training of Birth Injured Children Considered as Disabled Children and Not as Mentally Deficient Children.* EDWINA A. COWAN, Wichita Child Research Laboratory.
2. *The Influence of Complexes on Work Curves.* M. M. WHITE, University of Kentucky.
3. *A Comparison of Questionnaire and Performance Scores on Functional Psychotics and Psychoneurotics.* RALPH M. MCGRATH, Kemper Military School.
4. *Emotional Factors in the Etiology of Stammering.* MAURICE H. KROUT, Chicago City Junior College.
5. *Fascist Attitudes: An Exploratory Study.* ROSS STAGNER, People's Junior College of Chicago.

SECTION C

F. C. DOCKERAY, Ohio State University, *Chairman*

1. *A Study-Attitude Scale.* NEAL DROUGHT, University of Wisconsin.
2. *The Influence of "Subject Factors" on School Marks.* ELMER B. ROYER, Oklahoma A. and M. College.
3. *The Value of Instructions in Making Notes.* STEPHEN M. COREY, University of Nebraska.
4. *Does the Junior College Student Belong on the Secondary Level or on the Level of Higher Education?* ROBERT A. HARDIN, Nebraska Wesleyan University.
5. *The Value of a Political Debate.* D. A. WORCESTER, W. BALLER, and A. J. FOY CROSS, University of Nebraska.

FRIDAY, MAY 10, 2:00 P.M.

SECTION A

LYLE LANIER, Vanderbilt University, *Chairman*

1. *The Influence of Subliminal Visual and Auditory Stimuli on Verbal Responses.* LYNN E. BAKER, University of Wisconsin.
2. *A Further Study of the Color Discrimination of Color Blind Subjects.* A. R. LAUER, Iowa State College.
3. *The Dependence of Contrast Sensitivity upon the Presence of Other Contrast Borders in the Vicinity of the Test Object.* GLENN A. FRY, Washington University School of Medicine.

4. *Some Factors Common to Flicker and Gamma and Real Movement.* S. HOWARD BARTLEY, Washington University School of Medicine.
5. *Effect upon Cochlear Function of Intense Tonal Stimulation.* GLEN FINCH and ELMER CULLER, University of Illinois.

SECTION B

HULSEY CASON, University of Wisconsin, *Chairman*

1. *Studies in the Influence of Tensions on Learning and Problem Solving.* J. C. STAUFFACHER and A. G. BILLS, University of Chicago.
2. *The Method of Common Points of Mastery as a Technique in Learning Experimentation.* FLOYD L. RUCH, University of Illinois.
3. *An Experiment in the Law of Effect in Learning the Maze by Humans.* HOMER B. REED, Kansas State College.
4. *Reaction Time and Conditioning.* CARL N. REXROAD, Stephens College.
5. *The Rôle of Meaning in Learning to Recognize Spoken Sentences by Their Vibrotactile Patterns.* LOUIS D. GOODFELLOW, Northwestern University.

SECTION C

JAMES P. PORTER, Ohio University, *Chairman*

1. *Common Elements in Silent and Oral Reading.* DONALD S. SWANSON, Iowa State University.
2. *Factors Contributing to Reading Disability.* PAUL A. WITTY, Northwestern University.
3. *Study of Good and Poor Reading by Synchronous Records of Eye and Voice.* GRANT FAIRBANKS and JOSEPH TIFFIN, University of Iowa.
4. *Relative Effectiveness of Summarizing and Rereading.* H. A. PETERSON, LOIS WATT, MARY KIMMELL, NORMA GRONEMEIER, and W. S. TALLYN, Illinois State Normal University.
5. *In Defense of Scientific Vocational Guidance.* RICHARD W. HUSBAND, University of Wisconsin.

FRIDAY, MAY 10, 7:30 P.M.

SYMPOSIA

Social Reconstruction: RAYMOND H. WHEELER, University of Kansas, *Chairman.*

Clinical Psychology: LUTON ACKERSON, Institute for Juvenile Research, *Chairman.*

Vocational Psychology: F. A. KINGSBURY, University of Chicago, *Chairman.*

Physiological and Sensory Psychology: S. RENSHAW, Ohio State University, *Chairman.*

The Psychology of Learning: H. A. CARR, University of Chicago, *Chairman.*

SATURDAY, MAY 11, 9:30 A.M.

SECTION A

J. J. B. MORGAN, Northwestern University, *Chairman*

1. *Variations in Electrical Resistance of the Skin in New-born Infants and Adults and Their Relation to Muscular Activity.* M. A. WENGER and O. C. IRWIN, State University of Iowa.
2. *Patterns in Emotional Reaction.* HAROLD V. GASKILL and GERTRUDE COX, Iowa State College.
3. *Motor Accompaniments of Orientation Perception.* RALPH E. GARNER, Nebraska Wesleyan University.
4. *The Dynamics of Spiral Movement in Man.* ROBERT L. BRIGDEN, University of Kansas.
5. *The Fundamental Components of Reciprocal Hand Movement.* DAVID P. BODER, Lewis Institute.

SECTION B

HARVEY A. CARR, University of Chicago, *Chairman*

1. *The Relationship Between Transfer and the Length of the Interval Separating the Mastery of the Two Problems.* M. E. BUNCH and M. ROGERS, Washington University.
2. *Social Motivation of Sexual Behavior in Monkeys.* A. H. MASLOW, University of Wisconsin.
3. *The Influence of Sodium Amytal on the Elicitation and Formation of Conditioned Reflexes in the Cat.* PAUL H. SETTLAGE, University of Wisconsin.
4. *On Direction Orientation in the White Rat; a Comparative Study.* R. H. WATERS, University of Arkansas.
5. *Color Discrimination of 4 Dogs, 6 Cats, and 8 Rats.* WILLIAM E. WALTON, University of Nebraska.

SECTION C

J. P. GUILFORD, University of Nebraska, *Chairman*

1. *Reliabilities and Interrelationships of Measures of Blood Pressure, Pulse, and Intelligence in College Students.* JAMES P. PORTER, L. SPARNON, and R. SELOVER, Ohio University.
2. *Some Needed Refinements in Statistical Techniques.* ALVHH LAUER, Iowa State College.
3. *The Double Hollerith Card System for Studying Test Data.* THEO. F. LENTZ, Washington University.
4. *The Effect of Different Methods of Scoring Test Papers on the Distribution of Class Marks.* JOHN A. GLAZE, Kansas State Teachers College.

SATURDAY, MAY 11, 2:00 P.M.

Address: WOLFGANG KÖHLER, University of Berlin

Subject: *A Psychological Approach to Some Problems of Neurology.*

SATURDAY, MAY 11, 3:30 P.M.

REPORTS FROM THE LABORATORIES

C. A. RUCKMICK, State University of Iowa, *Chairman*

SATURDAY, MAY 11, 6:00 P.M.

ANNUAL DINNER

Toastmaster: JOHN J. B. MORGAN, Northwestern University.

Address of Welcome: CHANCELLOR ERNEST H. LINDLEY, University of Kansas.

Address of the President: JOHN A. MCGEOCH, University of Missouri. Subject: *The Vertical Dimensions of Mind.*

PROCEEDINGS OF THE THIRTIETH ANNUAL MEETING OF THE SOUTHERN SOCIETY FOR PHILOSOPHY AND PSYCHOLOGY

LYLE H. LANIER, SECRETARY, VANDERBILT UNIVERSITY

The Thirtieth Annual Meeting of the Southern Society for Philosophy and Psychology was held in Nashville, Tennessee, on April 19 and 20, 1935. All sessions were held in the Noel Hotel, the headquarters of the Society. Vanderbilt University and George Peabody College were joint hosts of the meeting.

The annual meeting of the Council was held on Thursday evening, April 18, 1935. The following members were present: Balz, Dorcus, Dunlap, Geldard, Lanier, Pattie, Sanborn, and Winter.

Three psychology and two philosophy sessions were held, in addition to a joint session on the morning of April 20. Twenty-one psychology and twelve philosophy papers were read. The presidential address of Dr. John E. Winter was read at the annual banquet on Friday evening, April 19. The business meeting followed the joint session on Saturday morning, April 20.

MINUTES OF THE ANNUAL BUSINESS MEETING

The minutes of the Birmingham meeting were approved as printed in the October 1934 PSYCHOLOGICAL BULLETIN. The secretary noted that the title of C. A. S. Dwight's paper was omitted from the program printed in the BULLETIN. Dr. Dwight's paper, which was read by Dr. Liddell, was entitled *The Logic of Reality*.

The treasurer's report, audited by Dr. Joseph Peterson and approved by the Council, was accepted. Receipts of $267.10, disbursements of $136.69, and a cash balance of $466.78 were reported for the fiscal year 1934–1935.

Dr. Nafe made a statement concerning his work on the Committee on the First Course in Psychology, a joint committee of the Southern Society and of the Midwestern Psychological Association. Dr. Nafe succeeded Dr. H. B. English as chairman of the Sub-Committee on Content. A detailed questionnaire was prepared and mailed to institutions throughout the country, requesting detailed information

about the content and distribution of time in the introductory course in psychology. An analysis of the responses received by the time of the meeting revealed great variability both in the topics included and in the time spent on various aspects of the introductory course. The committee plans to prepare and print a report which will reveal the status of the content in introductory courses and which may be influential in the development of a more homogeneous type of introductory course. It was voted that the authority to approve the publication and distribution of this report be delegated to the Council.

The secretary announced that the Council had received verbal reports from Dr. Sanborn and Dr. Balz of the Committee on the Teaching of Philosophy. The data collected by questionnaire had been analyzed, and a preliminary statement prepared, commenting on the facts revealed by the study and indicating the rôle of philosophy in the curriculum. The Council recommended that this committee be authorized to prepare a final report and to distribute copies to college administrators in the South, after approval of the final report by the Council. This recommendation was adopted. Dr. Balz then outlined the work being done by a committee of the American Philosophical Association, under the chairmanship of Dr. M. T. McClure. This committee is securing from eminent philosophers statements about the rôle of philosophy in education, and, after making a digest of these statements, will send a generalized statement to college administrators throughout the country. It was voted that the Southern Society officially endorse the work of Dr. McClure's committee, and that the distribution of the report of the Committee on the Teaching of Philosophy be synchronized with that of Dr. McClure's committee.

In accordance with the action of the Society at the business meeting in Washington, April 15, 1933, the Committee on the Teaching of Psychology was automatically discharged upon the presentation of its final report at the Birmingham meeting, March 31, 1934. There was considerable discussion at the present meeting about the advisability of continuing this committee, but no definite action was taken. It was apparently the consensus of opinion that the Society's standards concerning qualifications for the teaching of psychology should continue to operate as stated in the original resolution on this matter, of May 3, 1926, but that no further official lists of qualified institutions and instructors would be published.

The changes in the constitution proposed by the Council at the

Birmingham meeting were adopted. These changes related to the requirements for election to membership, and are as follows:

1. The omission of "Experimental Education" from Article I, Section 2.

2. That Article II, Section 1, be changed to read as follows: "In order to be eligible for membership in the Society candidates shall be professionally engaged in the fields of philosophy and/or psychology, or shall have pursued, for not less than two years, a program of graduate study primarily devoted to philosophy and/or psychology."

Dr. Ross moved that the Society each year buy and distribute to members reprints of the presidential address, in case the address is published. This motion was adopted.

The following new members were elected, upon recommendation of the Council:

Burk, Joseph C., University of Kentucky, Lexington, Ky.
Craig, Sam B., Kendall School, Gallaudet College, Washington, D. C.
Katsoff, Louis O., University of Virginia, University, Va.
Kinney, Laurence F., University of Virginia, University, Va.
Taliaferro, Robt. C., University of Virginia, University, Va.

Upon recommendation of the Council, Dr. Albert G. A. Balz of the University of Virginia was elected President of the Society for the year 1935–1936. Dr. H. C. Sanborn, Vanderbilt University, and Dr. Marten ten Hoor, Tulane University, were elected to the Council for the years 1935–1938. Dr. H. M. Johnson, American University, was elected to the Council to complete the unfinished term of Dr. Balz (1935–1937).

The secretary announced that invitations for the 1936 meeting had been received from Agnes Scott College and from West Virginia University. It was voted to accept the invitation of Agnes Scott College, and to hold the next meeting in Atlanta on April 10 and 11, 1936.

A vote of appreciation was extended to the local representatives from Vanderbilt University and George Peabody College, for the arrangements made for the meetings.

PROGRAM

Presidential Address: *The Postulates of Psychology.* JOHN E. WINTER, West Virginia University.

I. Psychology Papers

Constructive Activity as a Process in Learning. J. J. RAY, George Peabody College.

Consonance Discrimination in Trained and Untrained Subjects. EUGENE BUGG, Vanderbilt University

Practice and Fatigue Effects on Visual Readjustment. Z. J. SCHOEN, University of Virginia.

Does Practice with Inverting Lenses Make Vision Normal? JOSEPH PETERSON, George Peabody College.

The Relationship Between the Character of the Transfer and Retroactive Inhibition. M. E. BUNCH and M. M. WINSTON, Washington University.

Analysis of Learning by Rational Methods. BUFORD JOHNSON, Johns Hopkins University.

Some Recent Experiments in Memory and Their Bearing on Theories of the Nature of Brain Traces. H. M. JOHNSON, American University.

The Sensitivity of the Skin to Mechanical Vibration. B. VON HALLER GILMER, King College.

A Critical Test of Binocular Interaction. S. R. WALLACE, University of Virginia.

An Evaluation of Current Theories of Contrast. FRANK A. GELDARD, University of Virginia.

Experimental Study of Color Naming. J. RIDLEY STROOP, Tennessee Polytechnic Institute.

An Illusion Due to Occultation. FRANKLIN C. PASCHAL, Vanderbilt University.

Is There a "Unit Trait" of Volitional Perseveration? ROY M. DORCUS, Johns Hopkins University.

The Effect of Fatigue or Boredom on Teachers' Marks. EMILY S. DEXTER, Agnes Scott College.

A Needed Emphasis in Psychological Research. C. C. Ross, University of Kentucky.

The Psychological. J. B. MINER, University of Kentucky.

An Item Analysis of the Maryville College Poetry Test with Respect to Sex and Certain Other Personality Differences. J. D. HARRIS, Maryville College.

A Further Report on Attempts to Produce Blindness by Hypnotic Suggestion. FRANK A. PATTIE, Rice Institute.

A Report on the Test-Retest Performance of 38 College Students and 27 White Rats on the Identical 25-Choice Elevated Maze. PAUL E. FIELDS, Maryville College.

A Method for Determining Student Efficiency. RALEIGH M. DRAKE, Wesleyan College.

Scoring Intelligence Tests by Weight. NOEL B. CUFF, Eastern Kentucky State Teachers College.

II. Philosophy Papers

Implication and Deducibility. JOSEPH BURK, University of Kentucky.

Modality and Probability. L. O. KATSOFF, University of Virginia.

Modal Functions. JOHN KUIPER, University of Kentucky.

The Presuppositions of Galilean Mechanics. W. S. WEEDON, University of Virginia.

The Electrical Syllogism. EDWARD E. RICHARDSON, George Washington University.

Comment on Dewey's "Common Faith". FRITZ MARTI, Hollins College.

The Theory of Movement in Aristotle as an Application of the Theory of Oppositions. R. CATESBY TALIAFERRO, University of Virginia.

Is Ethical Judgment Essentially a Priori? ANNA FORBES LIDDELL, Florida State College for Women.

Value Theory and Metaphysics. LEWIS M. HAMMOND, University of Virginia.

The Worship of Universals. MARTEN TEN HOOR, Tulane University.

A New Theory of Evolution. HERBERT C. SANBORN, Vanderbilt University.

Unity of Science and Reduction of Nature. ALBERT G. A. BALZ, University of Virginia.

PROCEEDINGS OF THE THIRD ANNUAL MEETING OF THE ROCKY MOUNTAIN BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

T. H. Howells, Secretary, University of Colorado

The third annual meeting of the Rocky Mountain Branch of the American Psychological Association was held at the Colorado School of Mines on November 30 to December 1, 1934. The following program was presented:

The Musical Talent of Mexican Children in Old Mexico.
Ethel Candor, University of Denver.

Use of the Bernreuter Personality Inventory Among College Freshmen.
Robert W. Shaw, Western State College.

A Classification of the Techniques of Appeal and Social Control.
M. E. Bonney, Western State College.

Reasons for Going to College.
J. D. Heilman, Colorado State Teachers College.

A Comparative Study of Mentally Exceptional Children in Wyoming Public Schools.
Maude Sholty, University of Wyoming.

Factors Entering into Determination of Right and Left Handedness.
Mary M. Roos, Colorado College.

The Validity Coefficients of the Binet Eighth-Year Tests.
William A. Blakely, Colorado College.

A Preliminary Study of Personality Factors in Retail Selling.
Richard J. Triplitt, University of Denver.

Nutrition and Mental Health.
Inga M. K. Allison, Colorado Agricultural College.

The College Placement Examination.
L. W. Miller, University of Denver.

A Study of Students' Masks.
Frank de Scoise, University of Denver.

The Ultra-Ocular Factor in Vision.
T. H. Howells, University of Colorado.

The Community of Ideas of Japanese Children.
JEAN FOOTE and T. R. GARTH, University of Denver.

The Foster Indian Child in the White Home.
T. R. GARTH, University of Denver.

The Effect of Varying Food and Thirst Upon Maze Performance.
ROBERT H. BRUCE, University of Wyoming.

Some Conclusions from Experiments Dealing with Interference in Learning.
ROBERT A. DAVIS, University of Colorado.

The Dichotomy Mechanism-Vitalism and the Organismic Point of View.
KARL F. MUENZINGER, University of Colorado.

An Investigation of Thorndike's Spreading Effect of Reward.
CLAUDE C. DOVE, University of Colorado.

The Effect of Vitamin B Deficiency Upon Maze-Retention.
MRS. FRANCES E. POE and ALDA WOOD, University of Colorado.

The Use of an Obstacle in Place of Punishment in the Visual Discrimination Habit.
HELEN NEWCOMB, Colorado Agricultural College.

A Comparison of Neuromuscular Skill of Whites and Negroes.
GRANVILLE B. JOHNSON, University of Denver.

Racial Differences in Handwriting.
DAN CAVARRA and T. R. GARTH, University of Denver.

Officers for 1935 are T. H. Howells, President, and T. R. Garth, Secretary.

BOOK REVIEWS

THORNDIKE, EDWARD L. *The Psychology of Wants, Interests and Attitudes.* New York: D. Appleton-Century Company, Inc., 1935. Pp. x+301.

The book consists of 2 parts. Part I contains 154 pages divided into 11 chapters. On page 4 we are told that this part is concerned with the ways wants, interests, and attitudes stimulate and guide thought and action, with the effect the addition or subtraction of a given want will exert upon an animal's nature and behavior.

The treatment of such a general topic must necessarily be limited in scope. There are 2 such limitations: (1) The treatment is confined to the following four wants, *viz.,* success, money, self-respect, and the esteem of the experimenter (p. 19). (2) Presumably it is also limited to the influence of these wants upon the rate of learning.

The discussion thus centers around learning experiments. For this purpose, the author summarizes the results of his previously published experiments and a considerable number of new experiments which are published in this volume.

The experiments are described in the author's customary terminology. (1) S denotes the stimulating situation. (2) R is the response elicited by S. (3) There is the strength of the connection between S and R. (4) R is followed by certain events which may be simple or complex in character, and which Thorndike terms consequents or after-effects. These events are the experimental variables whose influence upon the rate of learning is studied. Thorndike uses 4 sets of terms to describe their variable relation to the preceding behavior situation. They are characterized as rewards or punishments, as satisfiers or dissatisfiers, as relevant or irrelevant, and as belonging or not belonging to the situation.

Thorndike studies the relation of the following variables to the strength of the connection: the influence of belongingness, the influence of the subject's knowledge of belongingness, the influence of varying degrees of relevance, the relative influence of satisfiers and dissatisfiers, the relative influence of rewards and punishments, the influence of varying amounts of reward and punishment, the subject's knowledge of the nature of the connection and of the fact of strengthening, and the utility and interesting character of the material.

These experiments in learning are numerous and varied. The problems investigated are interesting and quite important, and the experimental findings should be summarized and subjected to critical comment. However, this learning material was presumably introduced for the sole purpose of throwing light upon the central topic of the book—how wants, interests and attitudes influence conduct—and consequently we shall limit our review to this aspect of the text.

The first question we shall raise is one of definition. What are these variables to be studied? The title of the volume specifies wants, interests, and attitudes. In the body of the text, the author frequently refers to wants, interests, attitudes, and *emotions*. On page 18, he also includes "any other propensities", and he states that he shall occasionally use the single word 'wants' as a class term to refer to all of the particulars previously mentioned. All of this is not very specific, and the author candidly disclaims any attempt at an accurate definition of these terms. We may note that this practice is quite common, for no author makes any pretense of defining every term that he uses. This practice is permissible and defensible in respect to secondary and accessory terms. But these wants, interests, attitudes, emotions, and other propensities are the very variables whose influence upon conduct is being studied, and in the reviewer's opinion all such variable factors should be defined as accurately as possible.

Their relation to the schematic representation of the learning situation is not defined. Are they a part of the complex stimulating situation S, a part of the response R, or are they attributive characteristics of the total activity? Presumably the wants are a part of the stimulating situation, for we are told on page 9 that wants tend to evoke behavior. There is no definite statement concerning interests and attitudes. The author on page 4 states that he is dealing with them in their active form, and presumably an active interest is an attributive characteristic of an act. As a matter of fact, the term is used in this way in chapter 9. The activity of reading various materials was rated on the basis of its interest. The question of definition is here of prime importance, for presumably the way these factors influence the rate of learning will vary with the relation in question.

We may next note that our knowledge of these wants is inferential in character. The experimental instructions set the task or goal, *viz.*, increasing accuracy of response. From our knowledge of human nature we assume that the subjects are coöperative, and hence strive to attain this end. The validity of this assumption is

usually attested by the fact of improvement with practice. The assumption that the subjects are motivated by the desires for self-respect and esteem of the experimenter is also an inference from our knowledge of human nature. The experiments employed a system of monetary rewards, and the assumption that the subjects are motivated by the want for money is an inference from our knowledge of the way people usually behave in reference to this object. These wants are not directly observable phenomena. Their presence in the experimental situations is an inference on the basis of our knowledge of human nature.

The want for success may be termed the primary want, while the other three are secondary or accessory in function. The goal which the subject strives to attain is accuracy of response, and under the conditions of the experiments, the wants for money, self-respect, and esteem of the experimenter can be gratified only by achieving accuracy. These accessory wants thus function by accentuating or reinforcing the want for success.

It is thus evident that we have some inferential knowledge of the nature of the wants and of their mode of operation in these experimental situations. This knowledge, however, is derived from our knowledge of human nature and the conditions of the experiments, and not from the experimental data.

Do the experimental data furnish any *additional* knowledge concerning their functional efficiency in the learning process? To secure such knowledge, the experimenter must vary the complex of wants in some definite and known manner, and note the effect of these variations upon the rate of learning. As the author has intimated, he must study the effect of the addition or subtraction of a given want, and, we may add, the effect of strengthening or weakening a given want.

So far as the reviewer can see, the wants for self-respect and the esteem of the experimenter remained constant in any one experiment. Any possible variation of the wants for success and money was presumably attained by manipulating the complex system of consequents.

In each experiment, the subject was given some knowledge of the correctness of his responses, and the character of this knowledge was one of the experimental variables. Experiment 3 is an illustrative example. In one group of connections, the subject was informed of the correctness of each response. In another group of connections, he was given information of the number of these that were correct. Further he was told that he was doing fine after each

2 successive correct responses. The relative strengthening of the various connections varied with these informative conditions. There are two possible interpretations. (1) We may assume that the strength of the want for success varies with the nature of the information, and that the rate of learning is a function of the strength of the want. (2) We may assume that the strength of the want is a constant irrespective of the nature of the information given, and that the informative knowledge influences the rate of learning by means of some other mechanism. So far as definite knowledge is concerned, one assumption seems to be about as good as the other.

Presumably the want for money can be controlled through the manipulation of monetary rewards. The system of monetary rewards employed was sometimes quite complex. Sometimes the experimenter varied the conditions under which the rewards were given, and any interpretation in terms of the relative strength of the want is a difficult matter. In several experiments a monetary reward was given after each correct response, and the amount of this reward was varied while all other conditions were held constant. There was no conclusive evidence that these rewards were effective. If we assume that the want varied in strength with the amount of the reward, we are forced to conclude that this want did not influence the rate of learning under the conditions of these experiments. However, there are other possibilities of interpretation.

In the reviewer's opinion, this process of inferring variations of a want from the conditions of the experiment, and explaining the rate of learning in terms of these inferences is a logical operation of no particular scientific merit. It is obvious that the truth of the conclusions is no better than the validity of the assumptions, and we may note that it is the truth of these assumptions—and not the rate of learning—that should have been experimentally investigated.

The above procedure may be contrasted with that of experiment 35 in which the factor of interest was investigated. The subjects were instructed to read 3 selections, and rank them on the basis of the interest aroused. The selections were then partially memorized, and it was found that the rate of learning increased with the degree of interest. This is a genuine experiment, for it was concerned with the relation between 2 independently observed variables.

With the exception of the above experiment, Part I, in so far as it is concerned with its avowed topic, consists primarily of an interpretative discussion of the author's learning experiments in terms of the inferred variable of wants. This interpretative discussion is

interesting and suggestive, but in the reviewer's opinion it contributes nothing definite to our understanding of the nature of wants or of the process of learning.

Part II contains 60 pages divided into 6 chapters, and it is concerned with the factors involved in the modification of wants, attitudes, and interests. In the reviewer's opinion, the author has made a genuine contribution to the solution of an important and neglected problem of psychology.

Aesthetic likes and dislikes are the particular attitudes investigated in a series of 9 experiments. Neutral items are presented in a list of aesthetically good items. The list is labelled as being mostly good, and the subject selects the 2 best. Likewise neutral items are presented in a list labelled as mostly bad, and the subject selects the 2 worst. The neutral items are then separately presented and aesthetically rated. It was found that those that had been previously presented in a good group usually have a higher rating than those in a poor group. As a control test, the experiments were repeated with the exception that the lists were not aesthetically labelled and the subjects made no selections of the best and worst specimens. Under these conditions, the aesthetic ratings of the neutrals were not altered. The aesthetic attitude of the subjects toward these neutral items was thus influenced by the labels and the selective reactions. The relative influence of these 2 factors was not investigated.

In a series of 6 experiments, the subjects recorded their aesthetic attitude toward a number of items in terms of a rating scale. In certain cases, they were informed that their judgment coincided with that of expert opinion. This social confirmation usually influenced their subsequent judgments of similar material.

In 7 experiments, the subjects were required to repeat a distasteful task, and after each performance to score their dislike in terms of an attitude scale. The initial attitude exhibited progressive changes with repetition. With most subjects, the initial attitude of strong dislike was gradually altered in the direction of indifference. With a few subjects, the initial attitude of mild dislike was transformed to one of mild liking, and in a few cases a slight degree of liking was succeeded by one of indifference. The results varied with the individual and the task. The author gives a suggestive analysis of the nature of the changes involved.

In the chapter on associative shifting, the author recounts the experiments of Watson and Jones, in which the fear and startle responses were transferred to a neutral stimulus. The published results of Bregman are then cited. A series of 6 neutral stimuli were

presented. Three were presented in conjunction with a negative response, and 3 with a positive response. No associative shifting, or conditioning, was obtained. The author concludes that associative shifting is not a universal phenomenon, but that it is obtained only under special circumstances as in the experiments of Watson and Jones.

The aesthetic attitude was arbitrarily chosen for study, and the author tentatively assumes that the same results would be obtained with the use of any want, interest, or attitude. He thus concludes that wants, interests, and attitudes can be trained, and that the same factors are operative as in the acquisition of knowledge and acts of skill. So far as these experiments are concerned, no new principles of learning are involved. This conclusion must be accepted with the same reservation as is any scientific generalization, *i.e.*, subject to confirmation or modification by further experimentation.

The experiments do not presume to be exhaustive. Not all possible modes of modifying attitudes were investigated. It is thus possible that there may be ways of modifying attitudes that are not applicable to the acquisition of knowledge and acts of skill, although the two operations are alike in many respects.

It has long been recognized that wants, interests, and attitudes, as well as other personality characteristics such as traits and abilities, are largely acquired in the process of mental development, but no one has subjected their mode of acquisition to a systematic experimental analysis. The author has thus opened up a new field of investigation, and, in the reviewer's opinion, the importance of these experiments is due more to this fact than to their factual contributions.

The multitude of experiments described in the book are of the 'pencil and paper' type. This fact may awaken a certain degree of distrust and even horror in those who find their greatest delight in the manipulation of complicated forms of apparatus. In the reviewer's opinion, the author has performed a distinct service in demonstrating that many well controlled and significant experiments can be conducted without these expensive accessories.

HARVEY A. CARR.

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BORING, E. G., LANGFELD, H. S., WELD, H. P., and collaborators. *Psychology: A Factual Textbook.* New York: John Wiley & Sons, 1935. Pp. xviii+555.

The present elementary textbook is a coöperative undertaking with each of the 19 collaborators contributing to chapters as follows:

L. Carmichael, on the response mechanism, develops the topic of the evolution of the response mechanism and the topic of the nervous system. D. W. Chapman writes on psychological measurement both with reference to statistics and to psychophysics. The chapter on vision is written by D. M. Purdy. Audition is discussed by E. G. Wever; taste and smell, by M. J. Zigler; and somesthesis, including somesthetic perception, by K. M. Dallenbach. E. G. Boring contributes a general discussion of intensity organized under the subheads of (1) intensity as a dimension of consciousness, (2) stimulus to intensity, (3) psychophysiology of intensity, (4) the Weber-Fechner function, and (5) intensitive sensitivity. W. Brown presents the topic of the perception of spatial relations; M. A. Tinker, the topic of temporal perception; and H. R. DeSilva, that of the perception of movement. The general problem of perceiving, discussed by S. Feldman and H. P. Weld, includes the sub-topics of constancy and growth of perceiving. J. A. McGeoch writes the chapter on learning; C. W. Bray, the chapter on imagery; J. G. Beebe-Center, the chapter on pleasantness and unpleasantness; C. Landis, the one on emotion; H. S. Langfeld, the chapter on action which ranges from reflexes to voluntary responses; G. Humphrey, the chapter on thought; and the final chapter on personality is contributed by D. Katz.

The publication of an elementary textbook in psychology is still of greater professional interest to psychologists than is the publication of an elementary book in the other sciences to the workers in those fields. Psychology is still in a transition period (although the present authors say that "experimental psychology has reached the stage of maturity") where the systematic and theoretical positions of the author will seriously affect the selection and organization of the material that is put into a book, elementary or advanced. Psychologists therefore examine an elementary textbook not only for its pedagogical contributions but for what the author has been able to do in the way of new and significant organization and interpretation. After all a science is not a mere compilation of facts. It is this plus systematization. From this point of view the great American elementary texts have been the psychologies of James, Angell, Titchener, and Watson. Other excellent texts there have been, but they have either followed in the paths laid down by those just mentioned, or they have been eclectic.

The fact that 2 of the 3 editors (Boring, Langfeld, and Weld) are former students of Titchener would lead the sophisticated reader

to expect a book much in the Titchenerian tradition. This expectation is further strengthened by an examination of the academic training of the whole group. Boring, Dallenbach, Feldman, Weld, and Zigler are former students of Titchener. Beebe-Center, Chapman, DeSilva, Humphrey, Purdy, Wever, and possibly Tinker are former students of Boring. Although the introduction of the book says that Behaviorism has been "tremendously influential" in psychology, only 2 or 3 of the authors have been directly exposed to this point of view. Only one has worked directly under a functional psychologist; and probably not more than 2 have worked with Gestalt psychologists. (An entire essay could be written on why all of the American converts to Gestalt psychology have been directly or indirectly students of Titchener.) Such a weighting of the author-population makes for unity in the presentation of psychology, but it also makes for interpretative bias.

In the first chapter on the nature of psychology, authorship not indicated, it is stated that the primary interest of psychology is in the understanding of the system of the organism and its environment. ". . . we have to do with an extremely complex physical system: an organism and its immediate environment. Events within this system have a definite causal order, thus: a stimulus affects a sense organ, something happens in the nervous system and the organism does something. It is in the understanding of this system that psychology is primarily interested." Such a statement from such a group of authors is certainly significant of the trend of psychology. It is difficult to see where consciousness can be placed in such a system, and the authors do not attempt to place it. They simply start talking about it as phenomenal experience (perhaps as something in which psychology is now secondarily interested). Introspection is merely a term for the observation of phenomenal experience. (I wonder how the authors would place it with reference to their statement of the primary task of psychology.) "The *modern* trend in psychology is certainly eclectic. Today psychology slips readily into the terminology of stimulus and response. It considers phenomenal facts for their own sake, or else it translates them into terms of the discriminative behavior which indicates their presence. It uses the introspective technique less and the animal subject more."

Let us continue to interest ourselves in the formal aspects of the book. A comparison of the present text with Titchener's *Textbook of Psychology,* published nearly 25 years ago, will be instructive. Table 1 gives the chapters in each book and indicates the relative

amount of space devoted to each. One notices first that the present text, in harmony with its aim to be factual, devotes only 1.5% of its space to general introductory discussion as opposed to 8.0% in Titchener. Again Titchener gives no space to Response (including the nervous system), except as he includes it under Action; and he gives but little attention to Personality, and that is included under Thought. Furthermore, and this is striking, Attention, to which Titchener devoted 6.9% of his book, disappears from the present text except as it is treated under Perception by Feldman and Weld. The word does not appear in the subject index! And yet in 1908 Titchener wrote that the "discovery of attention" was one of the

TABLE 1

A COMPARISON OF TITCHENER'S TEXTBOOK WITH THE TEXT BY BORING *et al.*

Boring *et al.* Pages of Text: 536			Titchener Pages of Text: 552		
Chapter	Title	% of Space	Chapter	Title	% of Space
1	Introduction	1.5	1	Subject Matter, etc.	8.0
2	Response	5.0	2	Sensation (Including Intensity and Measurement)	32.0
3	Measurement	3.9			
4–8	Sensation and Intensity	28.0	5	Perception	12.8
9–12	Perception	17.0	6–7	Association, Memory, Imagination	9.7
13	Learning	8.0		(Imagery alone about 1%.)	
14	Imagery	5.6			
15	Pleasantness and Unpleasantness	4.0	3	Affection	7.2
16	Emotion	4.0	9	Emotion	6.0
17	Action	7.9	8	Action	7.7
18	Thought	6.0	10	Thought	8.0
19	Personality	7.6	4	Attention	6.9

three things of which experimentalists could be proud! Titchener gave 32.0% of his space to sensation (including intensity and measurement). The present text gives 31.9% to the same topic. If we add Perception, we find that Titchener gave 44.8% and the present book gives 48.9% of space to the same combination. Would the present authors lead us to believe that one-half of factual psychology is concerned with this combined topic and that there has been no relative change in the last 25 years?

And so we could continue asking questions on the basis of the above table. In the present text, why should Affection be given as much space as Emotion? Is this due to systematic bias, or does it represent the present status of the science? The authors dropped the topic of Attention. Why then give Imagery 5.6% when Response (including the nervous system) only gets 5.0% and Emotion 4.0%?

The authors say in the preface, "Even a cursory examination of the book will reveal an uneven balance among the various chapters. This fault, if it is a fault, is that of psychology and not of the authors." But is there as much factual material on Personality (7.6%) as on Learning (8.0%)? There is an immense literature on conditioned responses, furthermore, which gets almost no representation.

When we turn from the formal, systematic aspects of the book to its actual contents, the story is different. Here I think little criticism can be offered that need be given emphasis. The authors are highly competent. They write clearly and concisely, treating the selected topics not in a Wundtian-Titchenerian but in a reasonably catholic manner. The book in its contents is unquestionably a dependable presentation of the selected topics at an elementary level. The sections on Sensation, Learning, and Action (but why this latter ancient term?) appeal particularly to me as the best available material for beginning students. There are probably some errors of fact that have slipped in, but I have not looked for them. I was struck, however, by the statement that Watson formulated the stimulus-response psychology. I am not sure what is meant by this. Certainly stimulus and response were slogans in the Chicago Department of Psychology under functionalism long before 1912; and even Watson did not defend a mere stimulus-response psychology from which the nervous system, and hence the contribution of the organism, was left out.

In conclusion, while praising the book very highly on its contents, I would say that it offers nothing new from the standpoint of formal organization and theory. From the factual point of view it is very excellent, although its widespread use as a textbook for elementary classes may be seriously handicapped by the great stress laid on Sensation and related topics.

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MURPHY, GARDNER. *A Briefer General Psychology.* New York: Harper and Brothers, 1935. Pp. xviii+572.

This reworking of the materials of the *General Psychology* (1933) is based upon the experience of teachers with the earlier book. The reduction in length which the new title emphasizes is not the significant change; reducing 647 pages of text to 531 pages would not in itself greatly enhance the usefulness of the book. The reviewer believes that those who liked the earlier edition will find this one even

more satisfactory, and that those who found fault with the first will be pleased with the many changes which have been made.

The fundamental plan of the 2 books is the same; the 28 chapters become 24, in essentially the old order. Only the chapter on experimental aesthetics completely disappears; the other chapters are lost through a recombination of materials. The 4 chapters on feelings and emotions become 2; a separate chapter on the interrelation of abilities is subsumed under intelligence. The 3 chapters on learning are reorganized. They were learning, memory, and theory of learning and memory; in the new book they are motor learning, imagery and association, and memory.

A number of teaching aids have been incorporated: (1) a more detailed analytical table of contents, (2) a brief summary at the end of each chapter, (3) 19 pages of references to sources and to collateral readings, related to page, paragraph, and line of the text, (4) a glossary in the index. The specific references greatly facilitate the instructor's task. The aids employed in the original book (bold-face headings, general references at the end of each chapter, questions for the student) have been retained.

An elementary textbook should be accurate, clear, comprehensive, and possess a distinctive quality which for want of a better term may be called vitality. By these criteria this book must be considered a real addition to psychological literature. It is accurate and comprehensive, its clarity has been greatly enhanced, and it has a character of its own. A new textbook does not have to be original in any dramatic sense of the term; in fact, most teachers prefer a book with a fairly conventional outline and familiar chapter headings, so that they may adapt their own teaching materials to the text. This is essentially a conservative book; its large number of chapters permits comprehensiveness without warping materials to fit a scheme. Its originality consists in the vigor and freshness with which the usual topics are illuminated. The expert will find fault with certain matters of fact and interpretation in his own special field; occasional reliance on untrustworthy experiments is one of the prices paid for having the text thoroughly up to date.

The 120 figures are an attractive feature of the book. Many of these are half-tones of experimental set-ups with subject and experimenter in place. Graphs and charts have been adopted instead of tables for indicating quantitative results. The 35 figures discarded from the earlier edition are mostly those which were less well integrated with the text, and tended to prove confusing rather than edify-

ing. The exhibits have been better connected with the text, both by reference in the body of the discussion and by improved captions. In the reviewer's opinion there are still a few figures which might be omitted or altered to advantage. Figures 9, 56, and 57 are neuro-anatomical diagrams, the first of which is useless because neither it nor the text tells anything about the cranial nerves which it prominently exhibits, the others because they are too difficult for those who have not studied neurology, and superfluous to those who have. Other figures to which exception may be taken are: Figure 11, the results of an injured pituitary without a control record to give it meaning; Figure 34b, a redundant diagram of the bones of the inner ear, already pictured in Figure 34a. (It adds the oval and round windows, but their initials on the diagram [F.O. and F.R.] are not explained to the student, and their names are not used.) Figure 42, a colored spectrum, fails to indicate the units (Ångström) in which the wave-lengths are measured. The original Bryan and Harter curve shows the plateau better than the reconstruction of Figure 71. The upside-down curve is of little importance for demonstrating the fact of negative acceleration. The text discussion of the several methods of measuring retention does not square with Luh's terminology as used on the retention curves of Figure 81. The anticipation method, prominent on the Luh figure, is given no mention, although it has perhaps been the most widely used method in memory experiments since Finkenbinder (1913).

Theory is eclectic and tolerant enough to include appreciative treatment of influences as divergent as Gestalt, conditioning, and Freudian repression. A brief essay in the foreword stresses the following principles: (1) that development is from the general to the specific; (2) that the specific elements which are the products of development may be resynthesized into a system of elements; (3) that the concept of dominance is of wide import; and (4) that the threshold is a fundamental conception. The first principle, given importance by Coghill and the Gestalt psychologists, is attributed to Herbert Spencer. The second principle is one which Gestalt psychology tends to overlook or negate. The third derives from Russian experiments as interpreted by Razran. The fourth principle is identified chiefly with Sherrington. The order of the early chapters on racial and individual development is probably determined in the light of the first principle. By the too literal generalization of Coghill's evidence that maturation results in specific reflexes, the chapter on individual development is somewhat forced. Starting out with the factual

material on maturation in human and animal behavior, the chapter ends abruptly with a discussion of reflex physiology. The fact is overlooked that maturation also results in the disappearance of specific reflexes (grasping, Babinski); nor is the reader led to expect such complicated and relatively unlearned behavior as nest-building to be one of the results of maturation. Experimental evidence does not give unambiguous support to the author's enthusiasm for the dominance principle; in many cases time order seems to be a factor more important than prepotency in determining what gets conditioned.

The final estimation of an elementary text must remain a matter of personal preference. Among those who favor conventional textbooks, there is disagreement regarding the amount of factual material books should possess; some prefer a conversational text which gives an outline to be supplemented by lectures; others prefer to provide the systematic thread of the discussion themselves, using the text as a quarry for factual content. Dr. Murphy's book provides a good balance between facts and commentary. Those who are looking for a text which will turn over a new leaf and break with tradition will not find it here. Some of us would like to see a book which concerns itself earnestly with concrete human motivation as manifested in everyday activities going by such names as curiosity, conceit, ambition; one which indicates the significance of anxiety, jealousy, and guilt, while subordinating the measurement of emotional expression and the James-Lange theory; one which recognizes the futility of superficial verbal knowledge of sense-organs and nervous pathways; one which treats of human capacities and interests as they are found among those who will use the textbook; one which recognizes the significance of psychological findings in matters of social control and of public policy. The reviewer believes that a fundamental textbook might be written from a new point of view, grounded in the laboratory, friendly to the clinic, realistic regarding the receptivity and retentivity of those who study elementary psychology. Dr. Murphy could have written such a book, but he chose rather to write a vitalized account which remains in the old tradition.

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DAVIS, R. A. *Psychology of Learning: A Textbook in Educational Psychology.* New York: McGraw-Hill Book Company, 1935. Pp. xii+480.

The author states in the preface that this book "is intended as a text for both undergraduate and graduate students in departments of

education and psychology". It is further said that "for students of education it may serve as a text in educational psychology, while for students of psychology it may be used as a text in the psychology of learning". This breadth of purpose creates a difficult problem for the reviewer who attempts to evaluate the book in the light of its adequacy for any one of the groups mentioned. Certain parts are found to be adequate for the undergraduate but inadequate for advanced instruction, while other parts are defensible when one is thinking of the training of advanced students but unnecessarily detailed or theoretical for the beginning student. In the same way, it is certain that some who use this book as a text in educational psychology will feel that certain extended treatments, such as that of four neurological theories of learning, could have been profitably replaced by treatments of topics more fundamental to an understanding of educational psychology, such as the meanings of the simple statistical measures, particularly the correlation coefficient, which are used throughout the discussions of experimental investigations. Those who use this book must expect to supplement copiously or select rigorously according as they are teaching advanced students or undergraduate students, educational psychology or the psychology of learning.

The book is probably less satisfactory as a text in educational psychology than as a text in the psychology of learning since omissions and brief treatments of fundamental topics are more numerous when that purpose is considered primary. Only 6 of the 19 chapters are concerned with topics in educational psychology other than the experimental psychology of learning and memory. These chapters are: "Objectives and Methods of Educational Psychology" (I), "The Bases of Improvement" (II), "Techniques of Study" (XVI), "The Measurement of Achievement" (XVII), "Relationships of Physical and Mental Traits" (XVIII), and "Personality and Mental Hygiene" (XIX). As has been mentioned, the book lacks a systematic treatment of the statistical concepts which are used throughout. But perhaps more serious in the eyes of some is the omission of systematic treatments of the distribution of abilities within the population, the nature and construction of intelligence tests, and the relation between practice and individual differences. (In regard to the last topic, Kincaid's study is mentioned briefly in the chapter on mental learning, and it is said that her findings "reopen the whole question of the relative influences of heredity and environment" [p. 163], but this line of evidence was not mentioned

in the earlier treatment of the influences of heredity and environment in determining individual abilities.)

The burden of orienting the beginning and advanced student with regard to the determinants of individual differences in learning ability and the nature of intelligence is carried by the thirty-one page chapter on "The Bases of Improvement". Here the author treats the problem of heredity *versus* environment, the theories regarding the nature of improvement in abilities, the interrelationship of different mental functions, and the concept of intelligence. After a presentation of the results of some studies of siblings, twins, and orphans, it is concluded that a middle road with regard to the heredity-environment controversy is advisable, and the studies of maturation, as well as the problem of maturation *versus* learning, are summarized on one page in the succeeding section under the heading "The Theory of Stimulated Growth". The theories of Spearman, Thorndike, and Thomson regarding the interrelations of mental functions are then presented briefly and the following evaluation is given: "There is no doubt that mental functions are related, but whether this relation is affected by a common element *g* as Spearman suggests, or by some other unknown interrelationship, as suggested by Thorndike, is not yet determined. The theories are significant in so far as they influence learning ability. Mental functions correlate with each other positively, though not significantly" (p. 42). In the final section of the chapter general intelligence is defined as "the ability of an individual to adapt himself to a relatively complex situation" (p. 43), *i.e.*, the intelligence test. The further statement that "Learning ability and intelligence are probably closely related and learning ability as measured by achievement is probably the best index of intelligence" (p. 44) may lead to some confusion in the mind of the student since earlier in the same chapter the author has stated definitely that intelligence tests measure innate ability and achievement tests measure the effects of training (pp. 19, 22).

With this one chapter as a groundwork in the fundamentals of individual differences in ability, the next 13 chapters deal with theory and experimental results in the field of learning and memory. The first 2 of these chapters are concerned with "The Neurological and Psychological Bases of Improvement" and "The Explanatory Principles of Learning". Learning is defined as "progressive adjustment to continuously changing conditions of life", or more exactly as a modification in the direction of improvement "which occurs as a result of response to stimuli" (p. 69). Improvement is held to be

the essential characteristic of learning, "for otherwise (change) is deterioration or forgetting" (p. 69). These definitions want something in clarity, and it is unfortunate that the student is not shown how they may be applied so as to include phenomena such as experimental extinction and negative adaptation, which have been traditionally called learning. Similar applications would perhaps have aided the student in distinguishing between learning and maturation, and between forgetting and the work decrement.

The remainder of the first chapter on theory is devoted to a survey of the receptor-adjustor-effector mechanism, to the neural theories of learning proposed by Kappers, H. M. Johnson, Cason, and Lashley, and to the "psychological bases of learning". Under this last heading it is said that "whenever the reactions of the organism are purposive consciousness is implied", and that "where consciousness, because of a lack of experience on the part of the organism, cannot serve as a complete aid in making adjustments to new conditions in the environment, the organism must resort to trial-and-error methods" (p. 90). As explanations of learning of the trial-and-error type, 9 theories are cursorily cited in the second theoretical chapter. For example, Watson's theory is presented but nothing is said regarding the crucial studies of learning when frequency and recency are negative; the conditioned-response theory is presented but the recent serious attempts to make the theory adequate are not mentioned. The writer concludes this discussion with a series of explanatory principles of learning of which the one concerned with selection and elimination is "Selection and elimination are affected by congruity and incongruity with purposive activity. Congruity signifies that the individual selects from his experience those configurations that promote purposive activity" (p. 117). The factors which influence the economical development of learning, as contrasted with the explanatory principles, are then listed. These factors are: (1) *common elements*—"the term *common elements* means that reaction to any situation is dependent upon elements in past experience which are similar to those of the present" (p. 117); (2) *frequency*—"frequency refers to the use or practice of a function to be improved . . . [and] . . . the term *disuse* is employed to characterize the atrophy of a habit as a result of the absence of frequency" (p. 119); (3) *primacy*—Thorndike has criticized primacy; "however, Thorndike's conclusions do not limit the effectiveness of the principle that correct reactions should be formed during the initial stages of learning" (p. 121); (4) *recency*—"recency postulates that

there must not be too long a time between learning and relearning" (p. 121); (5) *effect*—"effect refers to the feeling accompaniment of response" (p. 121); (6) *intensity*. It will be noted that the factor of contiguity is not listed. A search of the other chapters on learning failed to reveal any statement regarding the time factor in association or any mention of remote associations or backward associations.

The remaining chapters on learning summarize briefly some of the experimental findings in the field of learning and memory under the following chapter headings: "Improvement in Motor Learning", "Improvement in Mental Learning", "The Permanence of Learning", "Transference and Interference in Learning", "Influences Detrimental to Learning" (fatigue, drugs, loss of sleep, ventilation, etc.), "Attitudes and Incentives", "Attention and Interest", "Guidance Techniques", and "Modes of Presentation". These chapters cover the experimental literature on the topics indicated with reasonable adequacy for beginning students, but it may be doubted whether they would be entirely satisfactory for advanced instruction in view of the relatively numerous omissions and misstatements of important facts and theories. It is felt that the following samples from these chapters are representative.

In treating of the form of the learning curve for "motor" and "mental" learning the author not only contradicts himself but also confuses the learning curve with the curve for mental work. He says: "In the acquisition of skill the convex type of curve is common, while in mental learning the concave type is often found. Curves of mental learning have also been classified as convex-concave and as variations of these forms. Meumann claims that there are at least three types of curves for mental work. One reaches maximum efficiency at the beginning and decreases with many fluctuations; another obtains maximum efficiency only after an interval of great length; while a third shows slower adaptations and high degree of resistance to fatigue" (p. 153). Four pages later (pp. 157–158) the author contradicts one of these assertions and continues the confusion between learning curves and work curves in the following statements: "The typical curve (of mental learning) indicates a relatively rapid rise in the initial stages of learning followed by a gradual increase in the later stages. . . . Thorndike, contrary to what most investigators believe, is skeptical of the existence of such a spurt."

In the chapter on "The Permanence of Learning" the author reviews the methods of measuring retention and then presents the

results of a survey of the literature on the problem of the relation between the degree of retention and the method of measurement employed. The summary is in the form of a series of composite retention curves which were obtained by combining the findings of many different investigators (Fig. 12, p. 214). *The curves show that retention is greater when measured by recall than when measured by either recognition or relearning.* Although the abscissa represents time intervals up to 110 weeks, and it is therefore impossible to compare the curves with those obtained in specific experimental investigations, it is perhaps of some significance that the conclusion stated above is in direct contradiction with the results obtained in C. W. Luh's definitive study of forgetting over intervals up to 1 day.[1] The same type of survey analysis is applied to the other factors which condition the degree of retention, with equally questionable results. This chapter on retention is also noteworthy for the absence of any reference to the phenomenon called retroactive-inhibition (which is treated briefly in the chapter on "Transference and Interference in Learning") and for the complete adherence of the author to the law of disuse as an explanation of forgetting.

In the chapter on "Transference and Interference in Learning" a survey of the experimental literature results in these general conclusions regarding positive transfer (pp. 254–255): (1) "transfer has been definitely established"; (2) "the amount of transfer is greater in the trained group than in the untrained group"; (3) "the amount of transfer varies in different individuals and within the same individual under different conditions; (4) "transfer takes place only when there is some conscious effort on the part of the individual"; (5) "transfer is enhanced by the development of methods and techniques". The first of these principles is further elaborated as follows (p. 270): "Investigations on motor and mental processes and in school subjects show that transfer is definitely established although the amount is probably nearer zero than 100 per cent." In treating of interference in learning, the major emphasis is given to retroactive inhibition, and no distinction is made between associative inhibition and retroactive inhibition or between proactive inhibition and retroactive inhibition. Several assertions made in this section are not well-founded in the more recent experimental literature. For example, on the basis of Skaggs' study[2] it is said that interpolated

[1] Luh, C. W., The Conditions of Retention. *Psychol. Monog.*, 1922, **31**, p. 31.

[2] Skaggs, E. B., Further Studies in Retroactive Inhibition. *Psychol. Monog.*, 1926, **34**, No. 161, pp. 20–25.

learning just after the completion of the original learning is more detrimental to recall than interpolated learning which occurs after an interval of rest. The recent work of Robinson [3] and McGeoch [4] indicates that this is not a valid generalization.

It must be reaffirmed that the evaluation of a book which has been written for students of educational psychology, for students of the psychology of learning, and for both elementary and advanced instruction, is fraught with difficulty. Nevertheless, all the difficulties to be encountered in the use of this book as a text cannot be attributed to the effort of the author to cover too many fields. The inaccuracies and vaguenesses, some of which have been listed, frequently overshadow in seriousness the omissions which in their own right justify lethal criticisms.

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BRUNSWIK, EGON. *Wahrnehmung und Gegenstandswelt—Grundlegung einer Psychologie vom Gegenstand her.* Leipzig and Wien: Deutick, 1934. Pp. xl+244.

This is a most significant essay. In it Dr. Brunswik summarizes a series of some 15 original experiments carried out under his direction [1] and develops a new, and to the reviewer's mind, extremely important theoretical doctrine.

[3] Robinson, E. S., Some Factors Determining the Degree of Retroactive Inhibition. *Psychol. Monog.*, 1920, **28**, No. 128, pp. 36–40.

[4] McGeoch, J. A., and Nolen, M. E., Studies in Retroactive Inhibition: IV. Temporal Point of Interpolation and Degree of Retroactive Inhibition. *J. Comp. Psychol.*, 1933, **15**, 407–417.

McGeoch, J. A., Studies in Retroactive Inhibition: II. Relationships Between Temporal Point of Interpolation, Length of Interval, and Amount of Retroactive Inhibition. *J. Gener. Psychol.*, 1933, **9**, 44–57.

[1] These are appearing in the *Archiv für die gesamte Psychologie* in a special series edited by Brunswik under the general title *Untersuchungen über Wahrnehmungsgegenstände.* The following 6 titles in the series have already appeared:

I. Brunswik, E., Die Zugänglichkeit von Gegenstände für Wahrnehmung und deren quantitative Bestimmung. *Arch. f. d. ges. Psychol.*, 1933, **88**, 377–418.

II. Holaday, B. E., Die Grössenkonstanz der Sehdinge bei Variation der inneren und ausseren Wahrnehmungsbedingungen. *Arch. f. d. ges. Psychol.*, 1933, **88**, 419–486.

III. Eissler, K., Die Gestaltkonstanz der Sehdinge bei Variation der Objekte

The experiments start in the tradition of the European work on "*Dingkonstanz*". Beginning, that is, with such general facts, already much investigated in Europe, as that sizes and colors and shapes tend to remain surprisingly constant in perception despite wide variations in their distances, illuminations, angular directions, etc., Brunswik approaches the whole subject from a new theoretical and experimental standpoint.

His theory begins by noting the distinction to be drawn between a quality as given immediately in perception (*i.e.*, as *Gegebenheit*) and this same quality as objectively determinable by objective processes of *measurement* (*i.e.*, as *Gegenstand*). *Gegenstände* are always intended (*intendiert*) by *Gegebenheiten*. But these intended *Gegenstände* are, by no means, always completely attained (*erreicht*). And this leads Brunswik to a generalized experimental program in order to discover in-how-far, and under what conditions, perceptual *Gegebenheiten* do or do not thus tend to achieve their intended *Gegenstände*. And in the pursuance of this program he is led to a further discovery. For it turns out that any given *Gegebenheit* such, say, as the perceived size of a man may intend as its *Gegenstand* either the man's "*real*" size (*e.g.*, 6 feet) or his "*projected*" size (*e.g.*, 6 inches) as this projected size would appear on some plane immediately in front of the observer. Further it also turns out that all that is actually attained in any given *Gegebenheit* is usually neither ideal, neither 6 feet nor 6 inches, but some value in between or, as Brunswik names it, some *Zwischengegenstand*.

Let us turn, for example, to one Holaday's experiments on size-constancy [2] (for reference see above). In this experiment a standard 7 cm. cube at a distance of 1 meter was compared with one after another of a series of different-sized comparison cubes at a distance of 8 meters [3]. When under these conditions the subjects were

und ihrer Einwirkungsweise auf den Wahrnehmenden. *Arch. f. d. ges. Psychol.*, 1933, **88**, 487–550.

IV. Klimpfinger, S., Über den Einfluss von intentionaler Einstellung und Übung auf die Gestaltkonstanz. *Arch. f. d. ges. Psychol.*, 1933, **88**, 551–598.

V. Klimpfinger, S., Die Entwicklung der Gestaltkonstanz vom Kind sum Erwachsenen. *Arch. f. d. ges. Psychol.*, 1933, **88**, 599–628.

VI. Izzet, T., Gewicht und Dichte als Gegenstände der Wahrnehmung. *Arch. f. d. ges. Psychol.*, 1934, **91**, 305–318.

[2] This is but one of very many sets of conditions which Holaday investigated.

[3] The 2 cubes, the nearer standard cube and the more distant comparison cube, were not placed directly in the same line of vision, so that there was no possibility of a direct optical projection of the one upon the other.

instructed simply to pick out those comparison cubes which "looked" approximately the same size as the standard cube, they tended (unless they had special instructions or came with a relatively unusual and artificial set) to pick out comparison cubes only a little larger than the much nearer standard cube. They tended to pick out, on the average, say, an 8 cm. cube. That is their propensity to *Dingkonstanz* was very strong. If, however, they were given the opposite *Einstellung* (by being purposely told to pick a comparison cube which looked as if "it would *project* the same size retinal image as the nearer standard cube"), they tended to pick out a much larger comparison cube, say, a 19 cm. cube. In neither case, however, did they achieve the ideal value. When they were set for "real" sizes they picked out (on the average) an 8 cm. cube, rather than a 7 cm. cube, and when they were set for "projected" sizes, they picked out (on the average) a 19 cm. cube rather than a 56 cm. cube (which latter at 8 meters would actually have the same projected size as the 7 cm. cube at one meter).

In each case, that is, a mere *Zwischengegenstand* was attained. Or, in other words, the value which was attained was apparently displaced from its intended value, or "pole", by the action of the other alternative pole. And in order to investigate and to measure this mechanism of displacement Brunswik has developed a formula for stating in percentage terms the degree to which a given obtained *Zwischengegenstand* attains, or conversely does not attain, its appropriate pole.[4] His procedure is to lay off the total distance between the two possible poles, that is in the above example between 7 cm. and 56 cm., in logarithmic units—with 0% at one end and 100% at the other. The actually obtained 8 cm. and 19 cm. *Zwischengegenstände* are thus, as shown by the following substitutions,

$$100\frac{\log 56-\log 8}{\log 56-\log 7}=93.5 \qquad 100\frac{\log 19-\log 7}{\log 56-\log 7}=48.0$$

equivalent to a 93.5% achievement of the 7 cm. pole in the one case and to a 48.0% achievement of the 56 cm. pole in the other. And this result of a much higher percentage achievement of "real" size than of "projective" size is, in general, characteristic of most perceptual situations.

[4] This formula was first used and published by Brunswik in 1928. *Cf.* Brunswik, E., Zur Entwicklung der Albedo-Wahrnehmung. *Zsch. f. Psychol.*, 1928, 109. A similar formula has more recently been developed independently by Thouless. *Cf.* Thouless, R. H., Phenomenal Regression to the Real Object. I. *Brit. J. Psychol. Genet. Sect.*, 1931, 21, 339–359.

It is, however, obvious that such results will depend in part upon the number and types of sensory cues available. Thus, for example, in the above case, the fewer the number of distance cues, the more the subjects will tend toward projective seeing (*i.e.*, seeing based upon the sizes of the retinal images only). Actually, however, it was discovered by Holaday that the tendency to see "real" sizes with what *a priori* might seem very inadequate distance criteria was surprisingly strong.

Perceptual *Dingkonstanz* is a surprisingly widespread and powerful propensity. It is found in the lower animals.[5] And it increases in young children from 2 to 10 but decreases slightly after 14.[6]

It is to be noted now further, however, that in both cases—in that of perceiving projectively as well as in that of perceiving "really"—the final perception, whichever it tends to be, has available the same total set of sensory cues. Thus, for example, in the case of size perception it has available the sizes of the retinal images plus the various distance criteria, such as lens accommodations, bi-retinal disparities, air perspective, and the like. But whereas, in the *Einstellung* for "real" size this combination of sensory cues must be utilized pretty much *in toto* to release correct "hypotheses"[7] as to the relative "real" sizes of the 2 cubes, in the case of the *Einstellung* for projective sizes only the retinal-image cues are to be utilized and the distance cues ignored if the correct "hypotheses" as to the relative projected sizes are to be released. (This latter, however, the organism often fails to do because of its overpowering habit-propensity for seeing real sizes.)

The perceptions in both cases involve: (a) immediate sensory cues (which are not usually, as such, conscious); and (b) a working-over of these cues, including sometimes the ignoring of certain ones of them, into hypotheses (the manner of this working over also is

[5] *Cf.* Kohler, W., Optische Untersuchungen am Schimpanzen und am Haushuhn. *Abh. d. kgl. preuss. Akad. d. Wiss., 1915, Phys. math. Klasse, Nr. 3.* For further references see also: Katz, D., Der Aufbau der Farbwelt. *Zsch. f. Psychol. Erg. Bd. 7. 2te Aufl. 1930.*

[6] Beryl, F., Grössenauffassung bei Kindern. *Zsch. f. Psychol.*, 1926, **100**; Brunswik, E., Zur Entwicklung der Albedowahrnehmung. *Zsch. f. Psychol.*, 1928, **109**; Klimpfinger, S., see above: Brunswik, Untersuchungen über Wahrnehmungsgegenstände, No. V.

[7] This notion that perception involves, functionally speaking, a process analogous to an hypothesis is implicit throughout Brunswik's treatment. It has also been given more explicit treatment by him and the present reviewer in a recent joint article. See Tolman, E. C., and Brunswik, E., The Organism and Causal Texture of the Environment. *Psychol. Rev.*, 1935, **42**, 43–77.

not conscious). The many failures and inadequacies of perception are to be explained as due either to: (a) confusions as between the 2 alternatively possible goals of "real" objects and "projected" objects; or to (b) the fact that any single sensory cue or any single limited group of sensory cues is by no means always unequivocally related to any single "real" value nor even in certain unusual artificial situations, to any single "projected" value of the corresponding *Gegenstand*.[8] Thus, a given size of retinal image taken by itself is not unequivocally related to any single real size in the corresponding objects. Only the total complex of size of retinal image plus distance cues is thus unequivocally related. And a similar equivocality is present though it operates less ordinarily as between size of the retinal image and projected sizes. For if lenses be introduced between the eye and the object, varying relations will also function as between any given retinal image size and actual projected sizes. But the perceptual apparatus is by nature surprisingly lazy and insensitive. And having found that a certain type of cue-element means a given object-value in certain cases, it tends to carry over the "hypothesis" of such a relationship to other cases where this relationship no longer holds. Typical optical illusions and other false perceptions result. It is one of the great services of Brunswik and his students to have uncovered so many of the mechanisms underlying such misperceptions.

We must note now finally, however, that Brunswik's analysis leads him, before he is through, to attack problems outside this initial problem of perceptual *Dingkonstanz* and of illusions *per se*. He discovers, that is, that his concept of *Zwischengegenstände* can illuminate still other more involved types of perception and even thinking and feeling. If, for example, subjects be presented (for brief exposures) with 2 groups of dots and the dots in the comparison group be individually larger than those in the standard group, and then, if the subjects be asked to select from the series of comparison groups a group which has the *same number* of dots as the standard group, they will tend to pick a comparison group with too few dots. But this Brunswik interprets to mean that their perceptions of the "number" of dots is affected by their simultaneous perception of the total area covered by the dots ("the total amount of paint which would be

[8] In fact, the actual causal-genetic relations between values of single cue-elements and corresponding values of "projected" objects or of "real" objects, are always apt to be equivocal '*mehr-mehr-deutig*'. *Cf.* Tolman and Brunswik, cited above.

required to make them"). And if, on the other hand, they be given the opposite *Einstellung* and told to pick out a comparison group in which the dots *cover the same area* ("would require the same total paint") they tend to pick out a comparison group with too many dots. Again their judgment is affected by the other possibility—that of judging, not on the basis of areas covered, but on that of number of dots. Whichever type of judgment the subject attempts, he is displaced in the direction of the other alternative pole. In short, all that he achieves in either case is a *Zwischengegenstand*.

Brunswik also applies this same type of analysis to demonstrate the influence of other still less simple types of "pole". He discovers, for example, that a 'confrontation' in perception of number and monetary value is possible. One may attempt to equate 2 groups of coins either on the basis of their respective numbers or (if the coins in the 2 groups have different monetary values) on the basis of their total monetary values. And whichever one tried to do, one's response tends to be somewhat displaced in the direction of the other. Again mere *Zwischengegenstände* are achieved. Further, it appears that in such an experiment one may even have 3 alternative poles. Thus the sizes of the individual coins in the 2 groups as well as their individual monetary values may be made different. And, if this be done, it is discovered that, on whichever of the 3 bases one attempts to equate:—on that of total area covered; on that of number of coins; or on that of total monetary values,—one's judgment will be displaced by each of the other 2. The ultimately obtained *Zwischengegenstand* is affected by all 3 poles.

Finally, Brunswik suggests the way for even more abstract problems. One could, for example, have subjects equate a series of individuals as to personality traits (*e.g.*, kindness). And, if one did so, again the outcome would undoubtedly be mere *Zwischengegenstände—Zwischengegenstände* between "manners" and actually significant acts, or between the "looks" of the individuals and their acts, or between conflicting features in their "looks". Thus in the end Brunswik generalizes his conceptual scheme so as to suggest that all psychological functions may be subjected to a similar method of approach and measurement. Every psychological function can, he suggests, in the last analysis be experimentally discovered, defined and measured in terms of the degree to which it achieves some objectively definable *Gegenstand* or falls between two or more such *Gegenstände*. Hence the general title of his essay *Psychologie vom Gegenstand her*.

In closing it must be emphasized that this review has by no means done justice to all the wealth and significance and suggestiveness of Brunswik's total doctrine. Three further very general features the reviewer would, however, like to emphasize. (1) The doctrine seems to be in essence a behaviorism. The tasks set the subjects are those of equating experiences. Analogous tasks can be, and in fact are set the lower animals by the behaviorists. (2) It is a behaviorism of a kind which the reviewer would himself espouse and which in other places he has attempted to designate as "purposive" or "molar". Or, to use Brunswik's own term, it is an "intentionalistic" behaviorism. (3) As such an intentionalistic behaviorism, it emphasizes a "third" dimension—the dimension, that is, of meaning or intention. Thus it is, as the author says, a psychology which considers (as a pure Gestalt psychology does not) the *Langschnitt* as well as the *Querschnitt* of mental life. Or, to construe this last point into the reviewer's own terms, it seems to be a Sign-Gestalt psychology rather than a mere Gestalt psychology.

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MUNN, NORMAN L. *An Introduction to Animal Psychology.* Boston: Houghton Mifflin Company, 1933. Pp. xxii+439.

MOSS, F. A., *et al. Comparative Psychology.* New York: Prentice Hall, 1934. Pp. xiii+529.

WARDEN, C. J., JENKINS, T. N., and WARNER, L. H. *Introduction to Comparative Psychology.* New York: The Ronald Press Company, 1934. Pp. x+581.

The meager supply of textbooks in the field of comparative psychology was almost doubled in the past 2 years with the appearance of these 3 new additions to this field. In the first of these books, which has the sub-title "The Behavior of the Rat", the experimental material is limited to behavior studies of the rat. An appendix of selected references on animals other than the rat has been added, however, so as to make the book more readily adaptable for use in courses in comparative psychology. The other 2 books were both directly designed for use as textbooks in courses in comparative psychology. The second book deals with the behavior of both infrahuman organisms and in a few instances with the behavior of human organisms while the last considers the behavior of only infrahuman organisms.

The organization of the book, *An Introduction to Animal Psychology,* by Norman L. Munn, is based on 7 fundamental problems of human and animal psychology which have been studied by the use of the rat as the experimental animal. The 7 problems are: (1) Unlearned Behavior; (2) General Activity and Persistence of Response in the Presence of Obstruction; (3) Sensory Processes; (4) The Rôle of Sensory Processes in Maze Behavior; (5) The Learning Process; (6) The Nature and Theoretical Basis of Learning; and (7) Symbolic Processes. Each of these problems is considered in a separate chapter and the experimental studies in which the rat was used are systematically reviewed in connection with each of these problems.

The organization of the book and the wealth of the experimental material that is reviewed make it an excellent book for reference work. A particularly commendable and desirable feature of the book is the inclusion of a large number of figures, especially the drawings of various types of apparatus with descriptive legends. The review of the literature on the behavior of the rat is so complete that remarkably few studies on the behavior of the rat have failed to receive at least mention. However, the fact that so much experimental material has been covered in a book of this size makes the book rather difficult reading and it tends in parts to be uninteresting and confusing to the undergraduate student who finds it to be a jumble of unfamiliar names attached, in many cases, to brief statements which have little meaning for him. Of all the chapters of the book, the present reviewer finds the last, which deals with symbolic processes, the weakest. However, since that is the chapter which deals with the topic on which the least experimental work has been done, it would probably of necessity lack the vigor of the rest of the book.

Comparative Psychology, edited by F. A. Moss, represents the coöperative efforts of 12 workers in the field of comparative psychology. The 15 chapters of the book, each representing some different aspect of the subject, were allocated to these 12 men according to their chief interests. The first chapter, "Why Study Animal Psychology?" by Edward L. Thorndike, presents very briefly various answers to that question. In the next chapter, "The Historical Background of Comparative Psychology", R. H. Waters divides the history of the movement into 5 different periods; and for each of these periods presents very briefly: "(1) The philosophical system which furnished the background of thought for the comparative psychology of that period; (2) the methods and techniques that were employed

and developed; and (3) the types of problems that engaged the workers."

Following these 2 chapters of general introduction, the remaining chapters deal with the more important topics of comparative psychology. In the next 2 chapters Calvin P. Stone gives an interpretative treatment of the experimental findings with regard to "Maturation and Instinctive Behavior" and "Motivation: Drives and Incentives". In Chapter V, "The Effect of Drugs and Internal Secretions on Animal Behavior" by F. A. Moss, the effects of a few classes of drugs are reported and the influence of the secretions of the endocrine glands are systematically presented. The next 2 chapters, which deal with sensory processes, are: "The Functions of the Receptors" by Donald M. Purdy, dealing with the topics of Vision, Color Vision, Hearing, Chemical Senses (taste and smell) and Space Perception; and "Discrimination" by Paul E. Fields in which visual, auditory, olfactory, gustatory, cutaneous, and proprioceptive discrimination and directional sense are included. In the latter chapter the author goes somewhat beyond the purely sensory forms of discrimination in animals and deals to some extent with concept formation as well.

The next 5 chapters, which deal with learning, include the mechanisms, the processes and the theories of learning under the topics of "The Neurology of Learning" by Shepherd Ivory Franz; "The Conditioned Reflex" by Howard S. Liddell; "Learning" by W. T. Heron; "Complex Learning Processes" by W. T. Heron; and "Theories of Learning" by Edward Chace Tolman. The last 3 chapters of the book deal with "Individual Differences" by Robert C. Tryon; and "Social Psychology of Animals" and "Gifted Animals" both by Otto L. Tinklepaugh.

As a whole this book is written so that it is read with ease and interest by the student. The happy choice of experimental material and its mode of presentation by most of the authors gives the student an introduction to comparative psychology that is both interesting and soundly grounded in scientific evidence. There is, however, some difference in the type of treatment given the material as well as in the style of presentation by the various authors. In some cases an interpretative treatment has been used while in others the reporting of facts and citing of the experimental literature has been the method used. This lack of consistency in the treatment of the material increases the difficulty of the text for the undergraduate student.

According to the preface, the *Introduction to Comparative Psy-*

chology by C. J. Warden, T. N. Jenkins, and L. H. Warner is an abridged and simplified edition of a comprehensive survey of the behavior of infrahuman organisms published by the same authors under the title of *Comparative Psychology*. Although the material for the 2 volumes was collected and abstracted by the 3 authors, the present volume was written throughout by the senior author who has kept to the same arrangement of chapters and to the same topical arrangement within the chapters as will be found in the larger work. In the first 6 chapters the historical, theoretical, and methodological developments of comparative psychology are treated. In Chapter VII a comparative survey of the morphology and physiology of organisms is made as an introduction to the succeeding chapters of the book. In this comparative survey the existing organisms are classified according to their genetic relationships and then analysis is made of the "types of mechanism utilized by various organisms in the stimulation-response process". General discussions of receptor systems and of transmission-reaction systems in the stimulation-response process are given in this chapter.

The phyletic survey, Chapters VIII–XX, begins with the Protista and continues through the plants and infrahuman animals to and including the Primates, which are treated in the last chapter. The topical arrangement is the same within each of these chapters, a general introduction and then a treatment of the stimulation-response processes under the 2 main headings Receptive Capacities and Reactive Capacities. The receptor systems are classified according to the type of stimulus which normally activates them. Eight major types of stimuli are considered: chemical, thermal, pressure, sound, light, gravity, electricity and magnetism, and internal. The reactor systems are classified according to: simple movements, feeding behavior, protective behavior, reproductive behavior, group behavior, motivation factors in behavior, and modifiability of behavior. In addition certain other special types of behavior such as orienting behavior, inactive states, sound production, and homing behavior are considered for certain groups in which one or more of those types of behavior are found.

The systematic treatment of the same topics for the main divisions of plant and animal life makes this book outstanding as an introduction to the general field of comparative psychology both as a textbook and as a book for reference use. The uniformity of the arrangement of the topics in each chapter is of value because it insures the treatment of the same topics for each of the phyla in so far as facts are

available and also because one can readily follow any of the topics through the various phyla. One difficulty with the type of treatment found in this book is the lack of direct comparison of the behavior of the organisms in the phylogenetic scale. In order to follow the phylogenetic development of any particular aspect of behavior the student must make his own comparisons. While the same aspects of behavior are treated for all phyla, the material is not always present in such a form as to make possible the desired comparisons. The present reviewer feels that the book would be more satisfactorily completed if the authors had included a final chapter on a comparative survey of the behavior of organisms which would be comparable to the earlier chapter on " Comparative Morphology and Physiology of Organisms ". The interpretative treatment used in this book tends to minimize the lists of workers in the various fields and place the emphasis on the behavior itself, a feature that is desirable for the undergraduate student.

These 3 books which deal with the behavior of animals differ considerably from each other in several respects. We have two general methods of approach to the subject of comparative psychology: (1) that of studying the various types of behavior and their appearance in the various divisions of the phylogenetic scale; and (2) that of studying the various phyla and the types of behavior found in each. *Animal Psychology* by Munn and *Comparative Psychology,* edited by Moss, use the former method of approach and cover the various topics in approximately the same order. *Introduction to Comparative Psychology* by Warden, Jenkins, and Warner, on the other hand, follows the second general method of approach. Only in the last mentioned of these books do we find plants and animals below the mammalia considered to any considerable degree. Both in *Animal Psychology* by Munn and in *Comparative Psychology,* edited by Moss, the treatment is almost entirely confined to mammalian behavior.

Another difference among these books appears in the differing degrees to which interpretation is used in presenting the material. In Munn's book is found the least, while in Warden, Jenkins, and Warner's book is found the most. In the book edited by Moss an interpretative treatment is found in an intermediate degree since the use of that type of treatment varies rather widely from author to author. Of the 3 books that by Munn contains the most complete and most valuable bibliography. In the book edited by Moss a complete bibliography of the sources used is given at the end of each

chapter while in the book by Warden, Jenkins, and Warner only a few selected references follow each chapter.

While each of these books makes a contribution to comparative psychology, Munn in the detailed and exhaustive systematic treatment of the behavior of the rat, Moss *et al.* by the general treatment of the subject according to the more important topics in comparative psychology, and Warden, Jenkins, and Warner by the greater equality of emphasis placed on the lower forms of life in the phyletic survey; yet it seems to the reviewer that we still lack a true comparative psychology in which the behavior of organisms has been systematically compared in accordance with its appearance and presence in the phylogenetic scale. Of course, the present reviewer is fully aware of the fact that the present status of our knowledge does not permit the writing of such a comparative psychology.

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Gemelli, A., and Pastori, G. *L'Analisi Elettroacustica del Linguaggio. I. Testo. II. Atlante Delle Tavole.* Pubblicazioni della Universita Cattolica del Sacro Cuore. Serie Sesta: Scienze Biologiche, Vol. VII. Milano: Società Editrice "Vita e Pensiero", 1934. Pp. xxviii+250 and Pp. lxxxviii.

This two-volume monograph continues the type of investigation which Helmholtz originated in his studies of the analysis and synthesis of vowel sounds. After an introductory chapter discussing the merits of modern electrical methods of recording speech sounds, the authors describe their own apparatus. A Western Electric condenser microphone, an amplifying unit, and a cathode-ray oscillograph comprised a system possessing practically linear transmission over the range from 100 to 10,000 cycles. Many records, both of isolated sounds and of whole words and phrases, were obtained. Precautions were taken to avoid abnormalities in the records due to extraneous electric currents, echoes, poorly calibrated instruments, and strained or unnatural speech.

In the third chapter analyses are made of 5 Italian vowels. All vowel records were divisible into 3 parts: an initial series of atypical oscillations while the normal pitch and intensity were being obtained, a series of typical oscillations, and a final period of decay consisting of atypical oscillations. Only the typical cycles are included in the analyses.

The vowel *i* (*feet*) consists essentially of 2 groups of frequencies.

The lower group includes the fundamental, the first overtone, and, for bass voices, the second overtone. The partial closest to 600 cycles has the greatest amplitude. The second group includes oscillations of small amplitude and high frequency (4,000 to 6,000 cycles).

The vowel *u* (*suit*) has the simplest structure of all. When given by high voices it consists of only a fundamental and the first overtone; when given by voices of low pitch the second overtone is added. Either the fundamental or the first overtone—the one closer to the 400–500 cycle range—has the greater amplitude.

The vowel *a* (*father*) presents an oscillogram of great complexity. Many overtones are normally involved; any overtone from the second to the seventh may be of the greatest amplitude; and several may be of relatively high amplitude. For one typical *a* the oscillogram shows a vibration which has in general a damped sinusoidal form with an irregular decrement. This pattern repeats itself every 7 cycles. The acoustic and graphic characteristics of the *a* are retained even though all overtones above the fourth are removed by electrical filters. This fact leads the authors to believe that the essential characteristics of the vowel consist of a pattern of frequency-phase-amplitude relations, rather than resonance at particular frequencies as reported by other investigators.

The vowels *e* (*fate*) and *o* (*hope*) are similar in structure to *a*. Like *a* they both involve a fairly large number of overtones, may have any one of several of the overtones the one of greatest amplitude, and are described by the authors as derivatives of the vowel *a*.

Because of differences in the manner of articulation it is impossible to make direct comparisons between the characteristics of the Italian vowels and the corresponding American vowels. However, for the sake of rough comparisons the following data on American vowels are included. As the fundamental characteristics Miller states that maximum resonance centers about the following frequencies: for *i*, 300 and 3,000 cycles; for *u*, 326 cycles; for *a*, 922 cycles; for *e*, 488 and 2,461 cycles; and for *o*, 462 cycles. Crandall states that maximum resonance occurs for male voices at mean frequencies of 296 and 2,987 cycles for *i*; 411 cycles for *u*; 955 cycles for *a*; 494 and 3,000 cycles for *e*; and 520 cycles for *o*.

Similar analyses for most of the consonants are given in the fourth chapter. The consonants are then classified as pure tones, somewhat impure tones, sustained noises, and instantaneous noises. The minimum duration of a phoneme sufficient for its perception is discussed in the fifth chapter. It is stated that there must be at least 2 typical

cycles before the sound is identifiable. The authors next discuss the tonal variations responsible for timbre differences. Variation of the typical cycles, the proportional amplitude of the fundamental and the first overtone, and the presence of small harmonics of high frequency are the most important factors. The greatest timbre differences exist in the articulation of the vowels. Individual variations in the semivowels are considerably less important, while the influence of the true consonants on the timbre of the voice is said to be imperceptible. The last chapter takes up the effects of grouping of sounds. Illustrative oscillograms of complete words are included. These show very clearly the transitional tones, noises, and atypical cycles occurring between typical cycles of adjacent phonemes.

The second volume of the work consists of 88 plates of oscillographic records which illustrate the analyses in the text. There is an index of authors, but no index of subjects. References to other books are not always complete.

There is little in this work which the reviewer wishes to criticize adversely. The points of theory and definition which might be questioned have little bearing on the value of the experimental findings. The work itself is a valuable addition to the earlier studies because of the detail with which both the distinguishing characteristics and the variability of each sound are discussed.

The final evaluation of this type of work should be determined by asking: How well does it enable us to give accurate physical definitions of the phonemes constituting the language? While the present results do not provide such definitions in anything like their ultimate form, they do discredit the skepticism of some writers who contend that it seems unlikely that positive knowledge of the structure of the different phonemes will ever be obtained.

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THORNDIKE, EDWARD L., and Associates. *Prediction of Vocational Success.* New York: The Commonwealth Fund, 1934. Pp. xxiv+284.

Vocational guidance enthusiasts have been disappointed and disturbed by this book. It reports the most careful and extensive attempt that has been made in this country to secure a critical quantitative check on the usefulness of school records and psychological test scores as a basis for vocational guidance. Unfortunately the results are not highly encouraging. But they are worthy of serious study,

both by persons concerned with the practical problems of counselling boys and girls, and even more by psychologists interested in mental measurement and its applications.

In 1921–1922, Professor Thorndike and his associates obtained records of 2,225 children in the New York City schools. Samples of children 14 years of age, and of children in the eighth grade, were taken. In addition to school records, data were secured from several tests of intelligence, clerical ability, and mechanical adroitness. The educational and vocational careers of the children were followed for 8 to 10 years (and will be followed further) to determine the value of the school and test facts for predicting later success.

The principal conclusions are these: *Educational progress* can be fairly accurately predicted, either from records of earlier school progress or from intelligence test scores. Success in *clerical occupations,* measured by earnings at ages 20 to 22, can be predicted only to the extent represented by correlation coefficients of .00 to .26. The clerical ability tests are best for this purpose, with mechanical ability, intelligence, and school progress next. Predictions of job level and of job satisfaction are considerably poorer than those of earnings. For persons in *mechanical* or *manual occupations* the results are even worse: the correlations with earnings are all between .00 and .14, suggesting that the records and scores are "nearly valueless, alone or in combination, as a means of forecasting success at mechanical work". A slightly more optimistic view is expressed on the crucially important problem of predicting whether an individual will succeed better at clerical or at mechanical work. "The higher a pupil's scores are in tests of clerical intelligence, clerical activities, general intelligence, school progress, and scholarship, the more his success at clerical work will surpass his success at mechanical work. Conversely, the lower his scores are in these items, the more advisable it is for him to choose mechanical work. But the differences are not great" (p. 116). The author's general conclusion is reflected in the following summary statement: "On the whole, the vocational histories of these boys and girls are not in accord with the opinions of those enthusiasts for vocational guidance who assume that an examination of a boy or girl of fourteen and a study of his school record will enable a counsellor to estimate his fitness to succeed in this, that, and the other sort of work" (p. 72).

The major conclusions are supplemented by many secondary findings of interest, a few of which may be cited by way of illustration: The pupils who go to college are "clearly an elite in intellect

and scholarship"; those taking evening courses beyond high school are less so, but still well above average. . . . Children who became criminals or loafers "were inferior at age 14.0 in all respects". . . . Working girls were somewhat abler than girls who are non-workers; married non-workers (girls) were somewhat abler than those unmarried, but among working girls those unmarried at 22 were abler than those already married; those who continue work after marriage are superior to those who do not. . . . "The children of clergymen, lawyers, physicians and the like are more successful in school and in the tests, and stay longer in school than the children of unskilled laborers, but earn no more at age 18.0 to 22.0." . . . High marks for conduct in school and regularity of attendance have no predictive value at all for later vocational success.

A number of critical questions arise concerning the conclusions. The essence of the method, it is to be noticed, is extremely simple. Give the tests and collect the school records; after an interval of years, ascertain the work each person is doing, how well he likes this work, and what his earnings are. If the correlation between the early records and the later accomplishment is very poor, the conclusion is that one cannot predict success much better than by chance and hence that a sound basis for vocational guidance does not exist. The limitations and difficulties of the procedures receive remarkably little emphasis in the report. But there are clearly serious questions to be considered. Certain of these are suggested in the following paragraphs.

(1) *First, are the tests and other prognostic procedures representative of the best methods now available?* If they are not, the results obviously tell us little about what may be accomplished with the more adequate techniques. The outstanding weakness of the study in this connection is the absence of any attempt to ascertain interests and personality traits. The authors recognize this limitation, and nevertheless declare: "But ours (items in the individual records) are fair samples. If they fail, there is no reasonable expectation that others available at age 14 will succeed" (p. 2). This confident claim receives no elaboration or defense. More realistically, and with puzzling inconsistency, a later page states: "If the promising measures of interest, honesty, coöperativeness, persistence, and other aspects of human nature and behavior provided by Strong, Hartshorne and May, and others had been available then, our predictions might have been improved, nobody knows how much" (p. 72).

It is important to notice that measures of interests and personality

traits are not merely additional refinements of matters otherwise covered. They are so different that we have little basis for guessing what they might have contributed to the accuracy of the predictions, especially since these motivational qualities may vastly alter the significance of the abilities possessed by an individual. The relationship between mechanical ability and success in mechanical work, for example, may be far closer for children who at age 14 had pronounced interests in matters mechanical than it is for a group most of whom, perhaps, disliked such work but later entered upon it for want of something better.

(2) *Are the criteria of vocational success adequate?* Again I shall single out one feature—the worst. The many good elements cannot make up for the weaknesses; the chain is still no stronger than its weakest link. The vulnerable spot here is the classification of those occupations which the youngsters enter. Three broad categories are employed: clerical, mechanical, and professional. Only the first two are used in the present report. Clerical, we soon find, includes not only the ordinary clerical types of work, but also errand boys and salesmen! Mechanical work is stretched to cover unskilled manual labor, elevator operating, dancing, prize-fighting, and driving a delivery wagon. Within aggregations of occupations as diverse as these it would be a marvel if any tests did show close correspondence with success. Think what a test is being called upon to do! It is to differentiate at one and the same time between good and poor bookkeepers, good and poor secretaries, good and poor messengers, good and poor retail salespeople, good and poor life insurance agents. Or it is to distinguish whatever ones of these occupations pay higher salaries from those that pay lower amounts. The mechanical test is being asked to separate successful from unsuccessful persons doing anything from shoveling coal to repairing Swiss watches, from driving a team of horses to giving exhibitions of interpretative dancing. As far as the evidence of this report goes, the possibility remains that first-rate predictions might be made for certain specific lines of work. Nor are any findings adduced to show how well or how poorly the specific kinds of work a pupil was later to follow might have been predicted, as distinguished both from his *level* of work and from his entrance into one or the other of the crude catch-all categories we have described.

Certain other serious limitations of the criteria are well pointed out by the authors—for example, varying standards of wages and ratings secured from scattered employers, and the fact that many

individuals have not been out of school long enough to be settled vocationally or to give clear indications of ultimate success. In the case of clerical workers, data suggest the probability that the predictive value of the tests and records may become greater at later ages. Changing economic conditions also, of course, affect the criterion measures, and while the investigators adopt corrections for the more obvious factors of wage rates and monetary changes, it is probable that other disturbing effects (for example, changing standards of the kind of work considered acceptable or desirable) are present which serve to bind the findings to an unknown degree to the particular social-economic period and to the peculiar conditions of New York City.

(3) *Are the predictive relationships of this study (even if we waive the foregoing difficulties and accept the findings at their face value) applicable to other conditions, where vocational* GUIDANCE *is given* (i.e., *where the data collected about individuals are* USED)? The research reported here is not a direct check on vocational *guidance* at all; no guiding or counselling occurred. The argument, however, is that *if* guidance had been attempted, the records and test scores *would have been* of little value. The evidence is the low correlations now found with success. But it is surely possible that higher correlations might have resulted if the pupils had been made *aware* of their strong and weak points; still more, if they had been advised how to develop and make use of their special abilities—and if measures had been taken to overcome economic limitations (by scholarships, etc.). Also, if occupational information had been made available as a basis for intelligent choice of vocation. None of these things was done.

In general, then, the fallacy is this: The results secured in this study (as in any study) are determined in part by the particular conditions, including in this instance the use or non-use of the test scores and records. Where vocational counsel is given, the conditions differ from those obtaining in this study. How significantly those differences will affect the correlation findings we do not know. Hence the greatest caution must be exercised in drawing conclusions about guidance on the basis of the material offered in Professor Thorndike's report.

(4) *How satisfactory are the statistical analyses and the interpretations, considered on their own ground?* Even with the data collected, that is, could more revealing analyses be made? Careful, approved, even imposing, statistical procedures are employed, cer-

tainly. But are they precisely the procedures appropriate to the problem? And are interpretations sufficiently circumspect? I can attempt only to illustrate the ground for such doubts.

(a) Dependence upon correlation coefficients and averages (together with superstructures of partial and multiple correlations) sometimes results in the missing of significant relationships which would appear in detailed analyses of scatter diagrams and distribution curves. For example, we read on page 33: "The grade reached at age 14.0 has almost no significance for the age at which one of these boys will leave school. . . . The correlation coefficient (Table 20) is .04." What Table 20 actually reveals is this: Of the students, age 14, in grade 8A or higher, 25% remain in school until they are 17 or older; of all other students, only 7% remain that long. *One-half* the advanced students (8A or above at 14) leave between the ages 14.6 and 16.4; *four-fifths* of the others leave within these ages. These are the relationships where there is "almost no significance". The same failure to go back of the correlation figures and averages is illustrated when the writers assert: "The score in the test of arithmetic and reading foretells practically nothing about how long one of these boys will stay in school thereafter. Boys scoring 90 or over stay no longer than boys scoring under 40" (p. 33). The table shows, however, that 36% of the boys above 90 (10 of 28) contrasted with 3% of those below 40 (1 of 34) leave school before the age of 14.8. Another instance is the interesting, though slight, tendency apparent in 2 tables showing school conduct marks in relation to earnings (pp. 41–42). Those with high marks tend to have either high or low earnings rather than medium—though the correlation coefficients are only .02 and .05. The authors say no relationship exists, presumably again on the basis of the coefficients alone.

The interpretation and practical implications of relationships like these are, of course, not discussed in the report, since the relationships themselves are not noted. Only a few scatter diagrams occur in the book, and hence it is impossible in most instances to go back of the correlation coefficients. The illustrations here mentioned, however, cause one to wonder what might be revealed by similar analyses in the other sets of data, which are not available.

(b) No analysis is offered of individual records in relation to success in specific occupations, or to choice of those occupations. A comparison is made of mechanical and clerical occupations as a whole, but, as previously pointed out, these groupings are so crude that they almost guarantee negative findings in the search for *differential* occu-

pational patterns. Hence the author's conclusion to the effect that "it is the duller and less skilful and less scholarly who profit by choosing mechanical work" (p. 71), must be tempered to an unknown extent by our knowledge of the queer constitution of the occupational groups. Even though the number of persons in more specific occupational subdivisions would have been small, enlightening tentative indications might well have been uncovered.

Moreover, the conclusion concerning the mechanical and clerical groups is based on decidedly questionable evidence. Three supporting sets of facts are mentioned (pp. 68–69); the first two do not necessarily support the conclusion (they do so only on the unstated assumption that test scores would be correlated with clerical success among those who have actually entered mechanical work, in the same way as the scores are correlated with success among those in clerical occupations); the third line of evidence consists of relationships represented by correlation coefficients the largest of which is .13.

(c) A number of secondary conclusions of the report involve interpretations that are at least incautious. Again a few samples: The fact that the persons who died before the age of 22 were in general inferior in tests and records, is interpreted without mention of possible explanations in terms of their economic status, lack of medical care, etc. As a matter of fact attention to this factor of economic position might well have shed light on a number of relationships in the study.—Boys and girls employed by relatives during the period from age 18 to 22 "tend to be inferior to the total sample in which they were tested". But the reasonable comparison is not with the total sample, including children who went to college, but with those who worked for non-relatives during the same age period.—On the basis of wholly inadequate data, and without the obviously needed warnings, the authors draw this striking (and almost certainly erroneous) conclusion: "The sons of unskilled day laborers compete in the industrial market nearly or quite on a level with the sons of merchants, professional men, and the like" (p. 107). With respect to the fact that physical size correlates with earnings we are told: "It may possibly be that size is a symptom of valuable moral or temperamental qualities not measured by us, but we probably have here an illustration of the unreasonableness of employers" (p. 111). This without a hint of such obvious alternative possibilities as the employers' desire (quite "reasonable", perhaps) to have persons of mature appearance for more responsible jobs, the possible correlation of size with health and energy, or with "Nordic" features. Matters

like these are not essential to the report as a whole. They do, nevertheless, add to one's doubts about the thoroughness and perspective with which the results were examined.

All in all, then, our conclusion is this: The long and arduous study here reported is highly important. It again makes vivid the need for careful, scientific checks on the value of psychological methods in predicting vocational fitness. Throughout the report one meets vigorous healthful emphasis on quantitative evidence as against mere opinion. However, the detailed procedures and conclusions of the inquiry take us only a short distance—and I fear at times the path is not in the right direction.

Quite aside from detail, moreover, one final thought may be in point. Individual vocational success is dependent on extremely complex combinations of interrelated factors. The separate measured abilities of a person are by no means the whole picture. Even were we to know *all* the traits of a person, it would still be insufficient. Vastly significant in addition are shifting requirements and opportunities, stimulating influences, training procedures and facilities for further development. Hence the underlying fallacy of the simplified (and widely subscribed to) statistical view expressed in the words: "The scientific basis for vocational guidance would consist in a set of regression equations, or tables made from them, whereby a person's probability of success in various lines of work under ordinary conditions could be determined from items of observable fact concerning him" (pp. 71–72). As Thorndike himself suggested years ago, the variables controlling fitness are so intricately interrelated that personally arrived at integrated pictures may be able to use data where correlation methods, however polished and elaborate, fail. Vocational guidance is a practical affair. As a practical enterprise it may be best evaluated by checking on its results *where a complete integrated guidance procedure is actually functioning,* where it is utilizing all the evidence it can secure about the boys and girls to be helped and about the opportunities open to them. This, I think, is what the British studies have attempted to do. They seem well worth repeating and extending in this country.

(Professor Thorndike has touched on certain of the preceding points in his reply to 2 earlier reviews. His answers seem to me to dispose of none of the points here made. The interested reader will find the reviews and the rejoinder in *Occupations,* October, 1934, and January, 1935.)

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GRIFFITH, COLEMAN R. *An Introduction to Educational Psychology.* New York: Farrar and Rinehart, Inc., 1935. Pp. xiv+754.

This is a text which is intended to give the student a comprehensive view of the field of educational psychology as derived from experimental studies of learning and mental development. It differs from older genetic presentations such as those of G. Stanley Hall, in that it is individual, not racial. It differs from such pioneer studies as that of Miss Shinn in that its data are derived from experimentation rather than from observation. But, like all genetic studies, its primary purpose is to give a "picture" of the developmental history of human behavior, the assumption being that the accomplishment of this task is the contribution which psychology is called upon to make in education. The author prefers to present these "pictures" through verbal description, there being no tables or graphs of any sort in the book. A copious bibliography is given in page-by-page footnotes, a reading list with suggestive comments being added at the end of the chapters.

While featuring in the main the modern genetic approach to educational psychology, the author makes use of other procedures, especially the stimulus-response methodology. However, he seems to wish to avoid the implications of an extremist's position. He says (p. 127) that the "student will realize that, in accepting the stimulus-connection-response formula as a working hypothesis for the explanation of all human behavior, we are not supposing for a moment that this formula marks the end of the matter, even though there are some teachers and some psychologists who seem to take this point of view". Precisely what constitutes the corrective for the thus admitted limitations of the famous formula does not seem quite clear to the reviewer. The author holds (p. 127) that even though one could exhaust the "stimulus-patterns or clusters of stimulus situations which impinge upon the organism *ab extra*, and even though one could complete the list of "postures, attitudes, habits and skills" employed by the organism in its responses, there still remain some differences between the infant and the adult which are not quite accounted for. Let no one conclude, however, that such differences are to be explained by saying "that there is a *mind* between the environment, on the one hand, and action on the other", since it is not possible for either the "psychologist or the educator to see a mind in action".

Throughout the book reiterated use is made of the notions of "figure and ground", "stimulus-situation", "reaction patterns", and other terms in common use in Gestalt psychology, although the

author does not go the length of explaining learning and development wholly in Gestaltist terms after the fashion, say, of Ogden or Wheeler. He seems to find it sufficient to substitute for the simple stimulus of S-R psychology a "stimulus-situation"; instead of the "muscle twitching" of Behaviorism he thinks of organismic or patterned reactions of Gestalt psychology.

In dealing with the issue of original nature and training the author proceeds on the assumption (p. 732) that "no trait can be accepted as original until it has been shown conclusively that it is not acquired". There is much experimental evidence, he says, going to show, for example, that the alleged instinct of acquisitiveness is of a "natural origin" (acquired?), and that it is not an "inborn nativity". However, he leaves the issue in the *status quo* by saying that "should this prove to be true, it would seem to follow that society . . . might hope . . . to modify human nature with respect to the trait of acquisitiveness". "If, however, education can be defined as directed becoming, where the processes of becoming apply to the unsuspected variety of human traits, then the real importance of an educational psychology based upon genetic principles can be discerned". While he says (pp. 582–583) that "not enough information is available to indicate how special environmental patterns may be related to the development of special traits", it is true that "as a general rule, excellence in any single trait is correlated with excellence in other traits". Moreover, "it is commonly assumed, both with respect to general intellectual ability and with respect to special traits and talents that heredity is a proper explanatory concept".

Using the terms x-system and y-system to designate heredity and environment respectively, the author suggests the term "buffering" to describe their interrelatedness (p. 333). The term is borrowed from physiology, where it is used to describe the process of maintaining a quasi-equilibrium between acidity and alkalinity of the blood.

In the treatment of intelligence the usual warnings are issued against the recognition of psychic entities. While intelligence must not be thought of as "a faculty or power or agent of which some people have more than others" (p. 533), but rather as a concept, still it is a useful concept, possibly "one of the most important tools the educator uses, because it enables him to express in a single word (or in a number) the general outcome of training or the general psychological excellence of children at different stages of development" (p. 535). He treats briefly (pp. 535 ff.) the relations of

what is thus conceptualized as intelligence to various skills, to the objects and situations which have become relevant, to the objects and events that have come to affect behavior, to the circumstances that may emotionalize behavior, to the factors that favor problem-solving, and to the way in which the "whole stream of behavior is organized and patterned".

Current theories as to the nature of intelligence are not treated. Although some references are made to Spearman's work, no consideration is given to his theory concerning the nature of intelligence.

Thinking is treated mainly under the heading of problem-solving, to which one chapter (Chapter Seven) is devoted. As a consequence of wrong conceptions of the nature of *mind*, the author says that it is usually taken for granted that the operation of thinking is based upon "an uneducable phase of human nature". One may with good reasons say that "problem solving has come almost as a by-product from training periods which emphasize other types of psychological functions". Hence the child enters maturity "with a degree of competence in problem-solving which is not much more than a precipitate from teaching methods which have really aimed at other results". Teachers, as a rule, he says, fail to try to teach problem-solving "during those years when teaching methods would be most effective". But he calls our attention to the fact (p. 240) that "the real essence of problem-solving is to be found in the insight or the hunch rather than in the methods that are used to prove the essential correctness of an insight or a hunch to some other person". It is the duty of educational psychology to furnish a "good picture of the situation out of which insights actually arise". It would naturally follow that it is the duty of education to provide those situations.

As to mental tests and what they measure, the author says that "we have found no evidence at all that intelligence tests in and of themselves measure innate hereditary faculty or power" (p. 554). They are merely measures of achievement. "A mental test", says he (p. 550), "reveals the actual number of adequate reactions that can be made to a sample list of stimulus patterns". Intelligence is expressible as a statistical evaluation of successful responses. They are "based upon the rate at which children acquire adequate modes of response to the objects and events around them". Differences in I.Q. may just as well be explained as being due to the variation of the "resistance of the individual differences to practice" as to be explained in some form of "hereditary fixity". Hence the "alleged

constancy" of the I.Q. "may be due to a sort of inertia not merely of original nature but of the environment as well" (p. 554). "An intelligence test", he says (p. 555), "simply states in a convenient arithmetical way the normal or average rate of learning of a large population". This rate of learning, he says, "may be due either to the inertia of germinal material or to the inertia of environmental systems".

The conception of the educative process in terms of growth (pp. *732 et passim*), as contrasted with education in terms of learning or mind-stuffing, as it is sometimes called, is strongly presented in this book, although conditioning, habit formation, and acquisition of skill are not overlooked. In order that a teacher may enable a child "to become more mature as a psychological instrument" (p. 507) it is necessary to have as complete a "picture" of the history of the processes of human growth as possible. Genetic psychology assumes the difficult task of giving this picture. The task is difficult in the first place, because, for the sake of completeness, one is tempted to be repetitious and to include materials too obvious to be mentioned. To mention very simple and obvious facts in a solemn way is likely to leave a student groping around to find whether or not he has failed to catch on to something which was really lying on the surface. The genetic methodology involves another difficulty, which is also common to reflexology, namely, that of making a connection between "tissue needs", which is the starting point of the genetic method, and practical classroom interests. Professor Griffith recognizes this difficulty. He says (p. 181) that "it looks as though a great gap must exist between tissue needs and such a concept as the ideal home or such a sentiment as patriotism". "Anyone", he says, "who would try to cover this gap would have to write almost a minute-to-minute biography of the development of a human being". Whether the idea of "tissue needs" of analytic, atomistic, and genetic psychology is useful as an explanatory principle in the study of human learning or usable in the administration of classroom procedures, is questionable. In spite of its scientific flavor it is in the main a speculative concept, so far as educational psychology is concerned.

While there is everything to recommend modern genetic methodology, it has certain hazards which have sometimes been overlooked in ultra-empirical methodologies, as the history of psychology proves many times. Picturizing is no doubt valuable, but whether it will automatically produce scientific explanation is not assured. Masses of minutiae about the growth stages of human behavior, many of

which do not go beyond the familiar facts of common-sense observation, and hence cannot excite interest or curiosity, may leave students muddled rather than informed, provided they are called upon to learn them. Whatever may be their value to research students of learning, their value to teachers is questioned by Professor Griffith himself. In the last lines of his book (p. 733) he says that good teaching "is done by persons who have a feeling for, rather than an extended knowledge of, the whole growth pattern". This raises the question as to what audience one should have in mind in writing a textbook on educational psychology. Should one think of one's colleagues or should one think of teachers in need of psychological principles in the prosecution of their work?

If it be a fault to overload any text with the commonplaces of common-sense observations (education has sometimes been derided as being the "unctuous elaboration of the obvious"), it is also a fault, in the opinion of the reviewer, to fill up a text in educational psychology with materials that should be handled in courses in introductory psychology. This fault cannot be entirely overcome by occasional moralizings about the "educational importance" of the topics under treatment.

Professor Griffith seems to have burdened himself unnecessarily throughout the book to vanquish the ghosts of faculty psychology. There are other and more real dangers to both psychology and education. There is the danger in education, for example, that we shall overlook the matter of human dynamics in our zeal for the conventional studies of the acquisitive processes.

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NOTES AND NEWS

The meetings of Section I (Psychology) of the A.A.A.S. will be held in St. Louis at the Hotel Statler from Monday, December 30, to Wednesday, January 1. In addition to the regular program of submitted papers, there will be a joint symposium of Sections I and Q on the general topic of maturation and learning, and at a joint banquet of Sections I and Q (Education), the vice-presidents of the sections will give their vice-presidential addresses.

Abstracts submitted by the members and fellows of Section I should reach the secretary, John A. McGeoch, Department of Psychology, Wesleyan University, Middletown, Connecticut, by November 8.

SPECIAL NOTE

The photograph of Georg Elias Müller which was published in the PSYCHOLOGICAL BULLETIN, 1935, 32, facing page 377, was taken by Professor Ed. Claparède on August 19, 1932.

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